



FACSIMILE

SF150T

SERVICE Manual

FACSIMILE



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1 Precautions

Follow these safety, ESD, and servicing precautions to prevent personal injury and equipment damage.

1-1 Safety Precautions

1. Be sure that all built-in protective devices are in place. Restore any missing protective shields.
2. Make sure there are no cabinet openings through which people- particularly children- might insert fingers or objects and contact moving parts or dangerous voltages.
3. When re-installing chassis and assemblies, be sure to restore all protective devices, including control knobs and compartment covers.
4. Design Alteration Warning:
Never alter or add to the mechanical or electrical design of this equipment, such as auxiliary connectors, etc. Such alterations and modifications will void the manufacturer's warranty.
5. Components, parts, and wiring that appear to have overheated or are otherwise damaged should be replaced with parts which meet the original specifications. Always determine the cause of damage or overheating, and correct any potential hazards.
6. Observe the original lead dress, especially near sharp edges, AC, and high voltage power supplies. Always inspect for pinched, out-of-place, or frayed wiring. Do not change the spacing between components and the printed circuit board.
7. Product Safety Notice:
Some electrical and mechanical parts have special safety-related characteristics which might not be obvious from visual inspection. These safety features and the protection they provide could be lost if a replacement component differs from the original. This holds true, even though the replacement may be rated for higher voltage, wattage, etc.
8. Components critical for safety are indicated in the parts list with symbols ⚡ ⚠. Use only replacement components that have the same ratings, especially for flame resistance and dielectric specifications. A replacement part that does not have the same safety characteristics as the original may create shock, fire, or other safety hazards.

1-2 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called "Electrostatically Sensitive (ES) Devices", or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor "chip" components.

The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

CAUTION: *Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.*

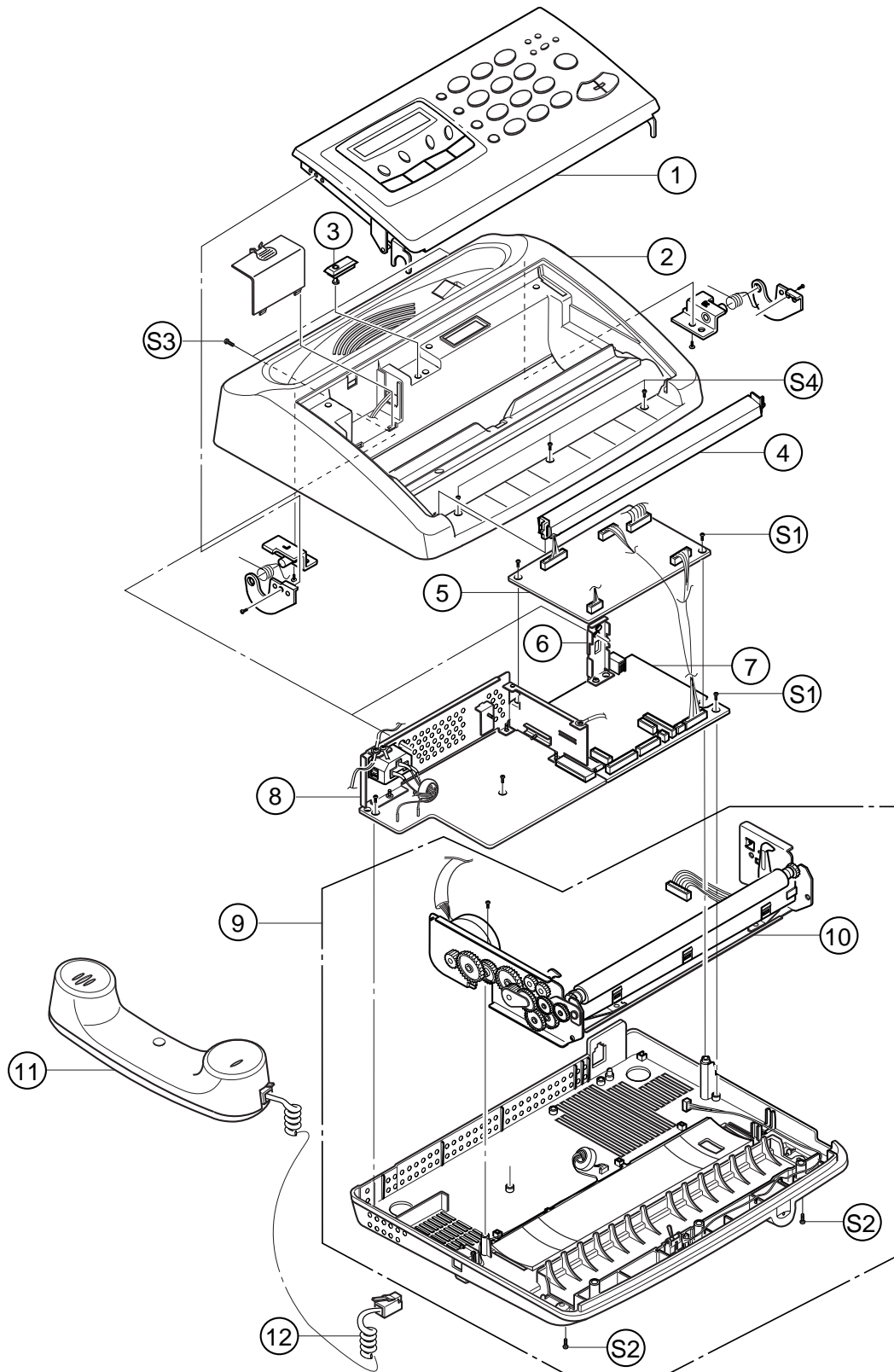
1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, *which should be removed for your personal safety reasons prior to applying power to the unit under test.*
2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.
3. Use only a grounded-tip soldering iron to solder or desolder ESDs.
4. Use only an "anti-static" solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESDs.
5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.
7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.
9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one's foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

1-3 Lithium Battery Precautions

1. Exercise caution when replacing a Lithium battery. There could be a danger of explosion and subsequent operator injury and/or equipment damage if incorrectly installed.
2. Be sure to replace the battery with the same or equivalent type recommended by the manufacturer.
3. Lithium batteries contain toxic substances and should not be opened, crushed, or burned for disposal.

8. Exploded Views and Parts Lists

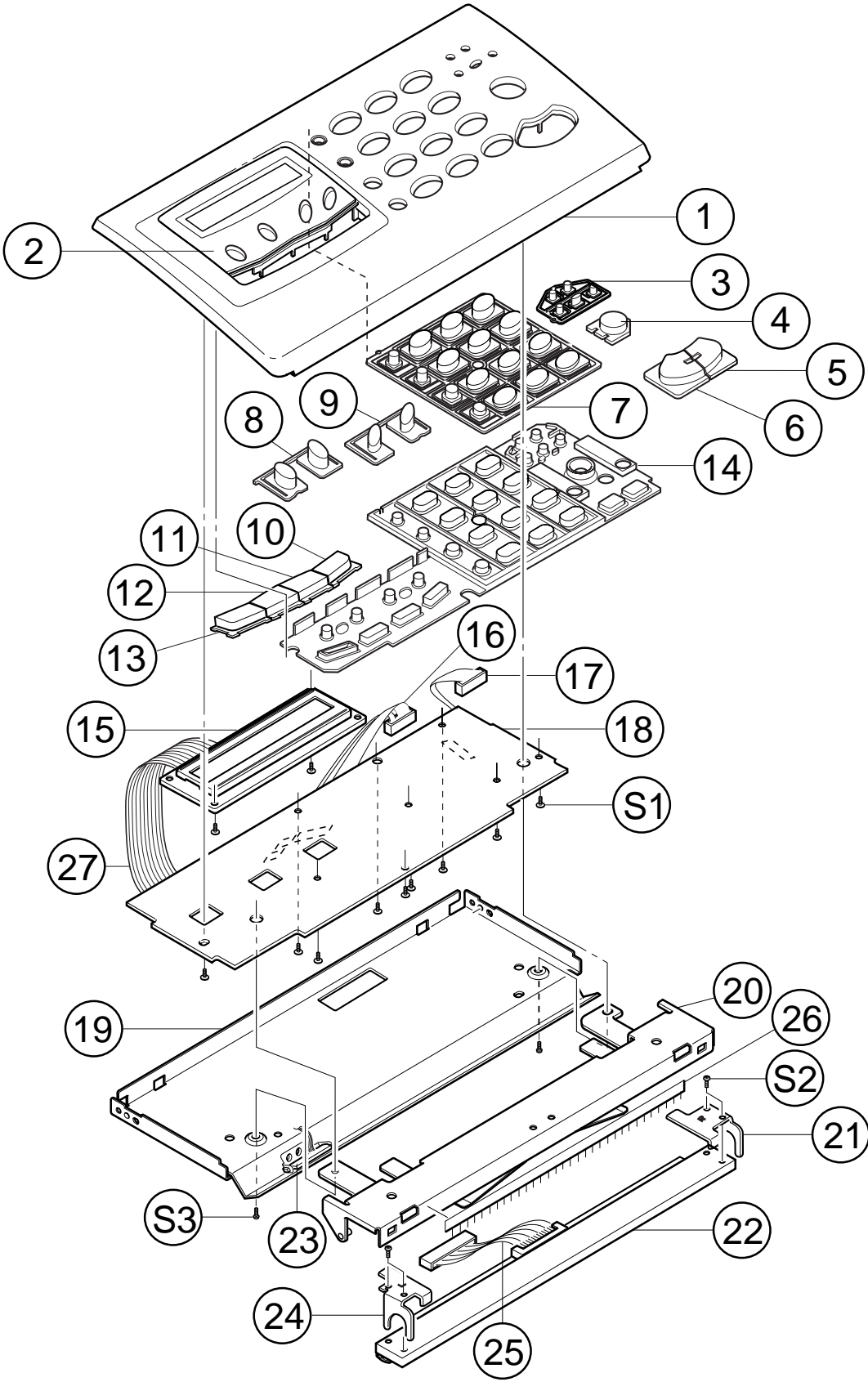
8-1. Total Assembly



Total Assembly Parts Lists

	Location No.	Description	SEC. Code	Q'ty	Remark
	1	ASS'Y-OPE UNIT	JF96-01296A	1	
	2	ASS'Y-TOP COVER	JF96-01297A	1	
	3	SPACER	JF72-40611A	1	
	4	GUIDE-TX	JF72-41122Z	1	
	5	PBA-LIU	JF92-00843Q	1	
	6	REAR-BRKT	JF70-10681A	1	
	7	PBA-MAIN	JF92-00842E	1	
	8	SMPS-V2, AC/DC	JF44-10059A	1	
	9	ASS'Y-BASE UNIT	JF96-01298A	1	
	10	ASS'Y-MAIN CHASSIS UNIT	JF96-01253A	1	
	11	ASS'Y-HANDSET	JF96-01262A	1	
	12	CURL-CORD	JF39-60075A	1	
	S1	SCREW, TAPTITE, BH, +, M3, L8	6003-000015	11	
	S2	SCREW, TAPTITE, BH, +, M3, L6	6003-000261	2	
	S3	SCREW, TAPTITE, BH, +, M3, L6	6003-000115	2	

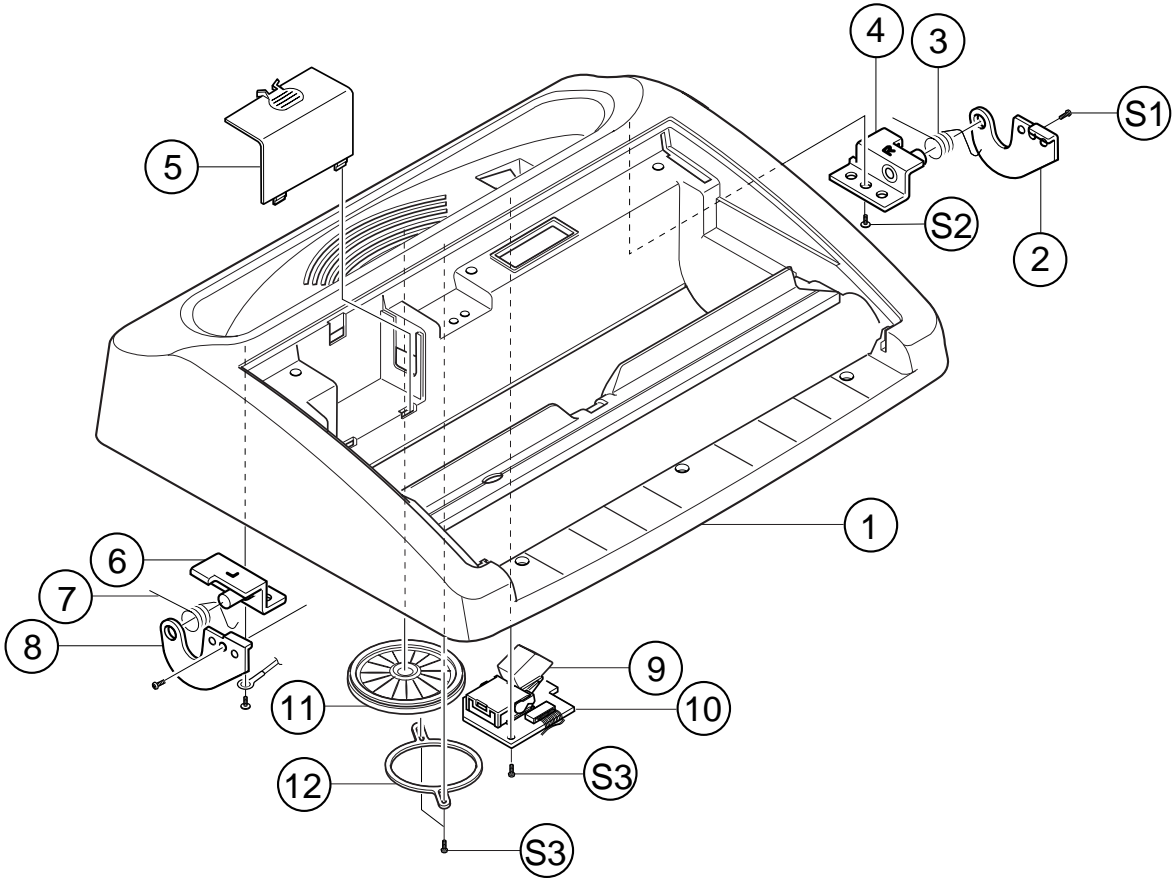
8-2. Ass'y OPE Unit



Ass'y OPE Unit Parts Lists

	Location No.	Description	SEC. Code	Q'ty	Remark
		ASS'Y-OPE UNIT	JF96-01296A	1	
	1	OPE COVER	JF72-42016Z	1	
	2	LCD-WINDOW	JF75-11004F	1	
	3	KEY-ONETOUCH	JF72-42021A	1	
	4	KEY-OHD	JF72-42022A	1	
	5	KEY-STOP	JF72-42029A	1	
	6	KEY-START	JF72-42028A	1	
	7	KEY-TEL	JF72-42026A	1	
	8	KEY-TAD(A)	JF72-42056A	1	
	9	KEY-TAD(B)	JF72-42057A	1	
	10	KEY-MENU	JF72-42020A	1	
	11	KEY-RESOLUTION	JF72-42018B	1	
	12	KEY-RECEIVE	JF72-42017B	1	
	13	KEY-ANSWER	JF72-42019M	1	
	14	RUBBER-CONTACT	JF73-40521A	1	
	15	DISPLAY-LCD	JF07-20061A	1	
	16	CBF-WIRE, MAIN-OPE, 18 P	JF39-41081A	1	
	17	CBF-WIRE, LIU-OPE, 7 P	JF39-40957A	1	
	18	PBA-OPE	JF92-00844B	1	
	19	CHASSIS OPE UNIT	JF70-10863A	1	
	20	BRKT-TPH UNIT	JF70-10861B	1	
	21	GUIDE-TPH(R)	JF70-10679A	1	
	22	PRINT HEAD-THERMAL	JF47-30069B	1	
	23	PBA-P.EMPTY	JF92-00704B	1	
	24	GUIDE-TPH(L)	JF70-10679B	1	
	25	CBF-WIRE, MAIN-TPH, 14P	JF39-40955A	1	
	26	BRUSH-ANTISTATIC	JF75-10650A	1	
	27	FLAT CABLE, OPE-LCD	JF39-41018A	1	
	S1	SCREW, TAPTITE, PWH, +, B, M2.	6003-000193	11	
	S2	SCREW-MACHINE, BH, +, M3, L4	6001-000125	4	
	S3	SCREW, TAPTITE, BH, +, B, M3, L	6003-000015	2	

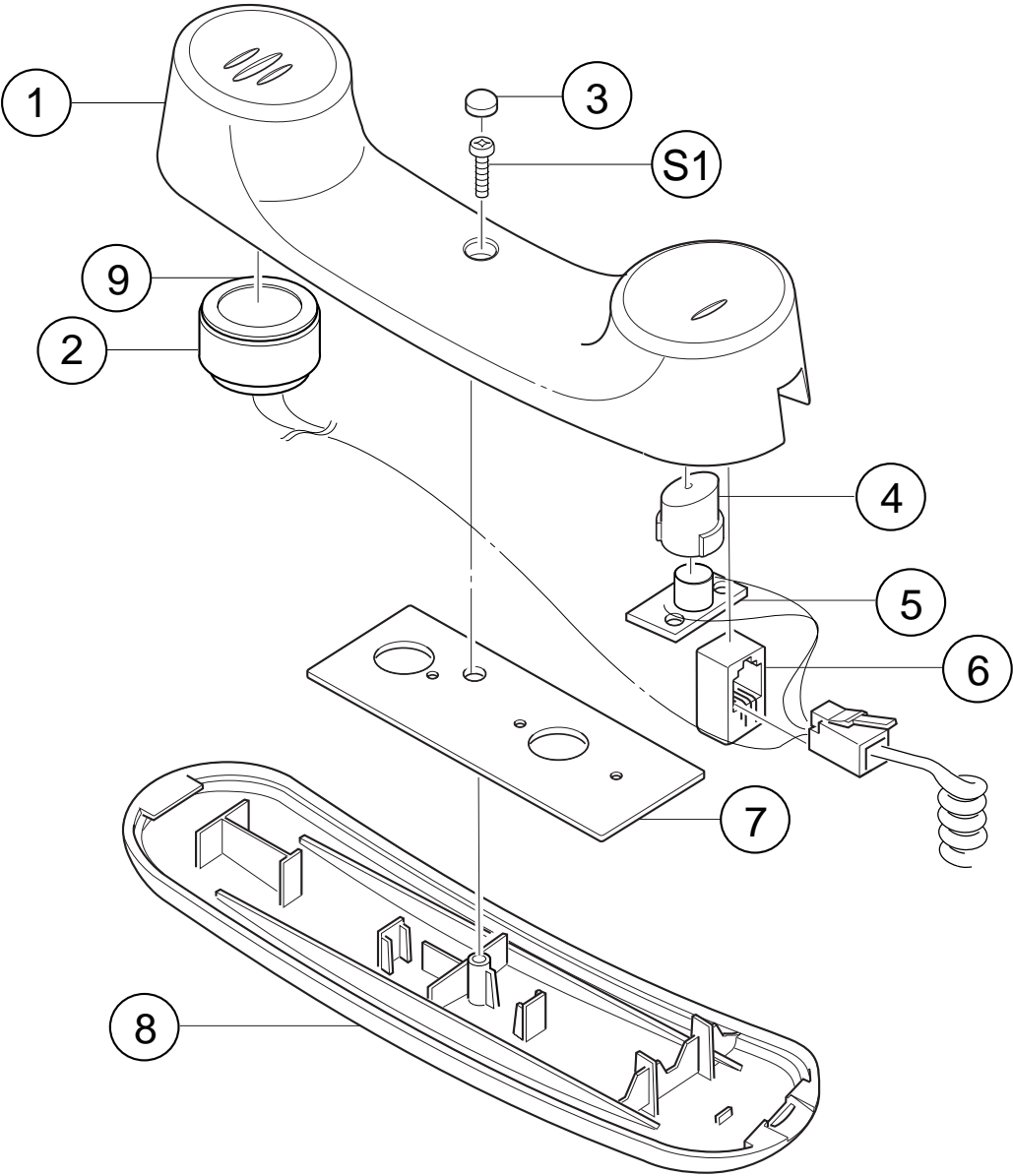
8-3. Ass'y COVER TOP



Ass'y COVER TOP Parts Lists

	Location No.	Description	SEC. Code	Q'ty	Remark
		ASSEMBLY-COVER TOP	JF96-01297A	1	
	1	TOP COVER	JF72-42015A	1	
	2	HINGE-OPE(R)	JF70-10676A	1	
	3	COVER-SPRING(R)	JF70-40562A	1	
	4	HINGE-BRKT(R)	JF70-10677A	1	
	5	BATTERY-COVER	JF72-42027A	1	
	6	HINGE-BRKT(L)	JF70-10677B	1	
	7	COVER-SPRING(L)	JF70-40562B	1	
	8	HINGE-OPE(L)	JF70-10676B	1	
	9	SWITCH-HOOK, 48 V, 200 mA	3409-000117	1	
	10	PBA-HOOK	JF92-00845C	1	
	11	SPEAKER, 1 W, 8 OHM, 83dB	3001-001044	1	
	12	UNIT-FIXING BRKT	GB70-10500A	1	
	S1	SCREW, TAPTITE, BH, +, M3, L6	6003-000261	3	
	S2	SCREW, TAPTITE, BH, +, M3, L8	6003-000015	2	
	S3	SCREW, TAPTITE, PWH, +, B, M2.5, L6	6003-000193	2	

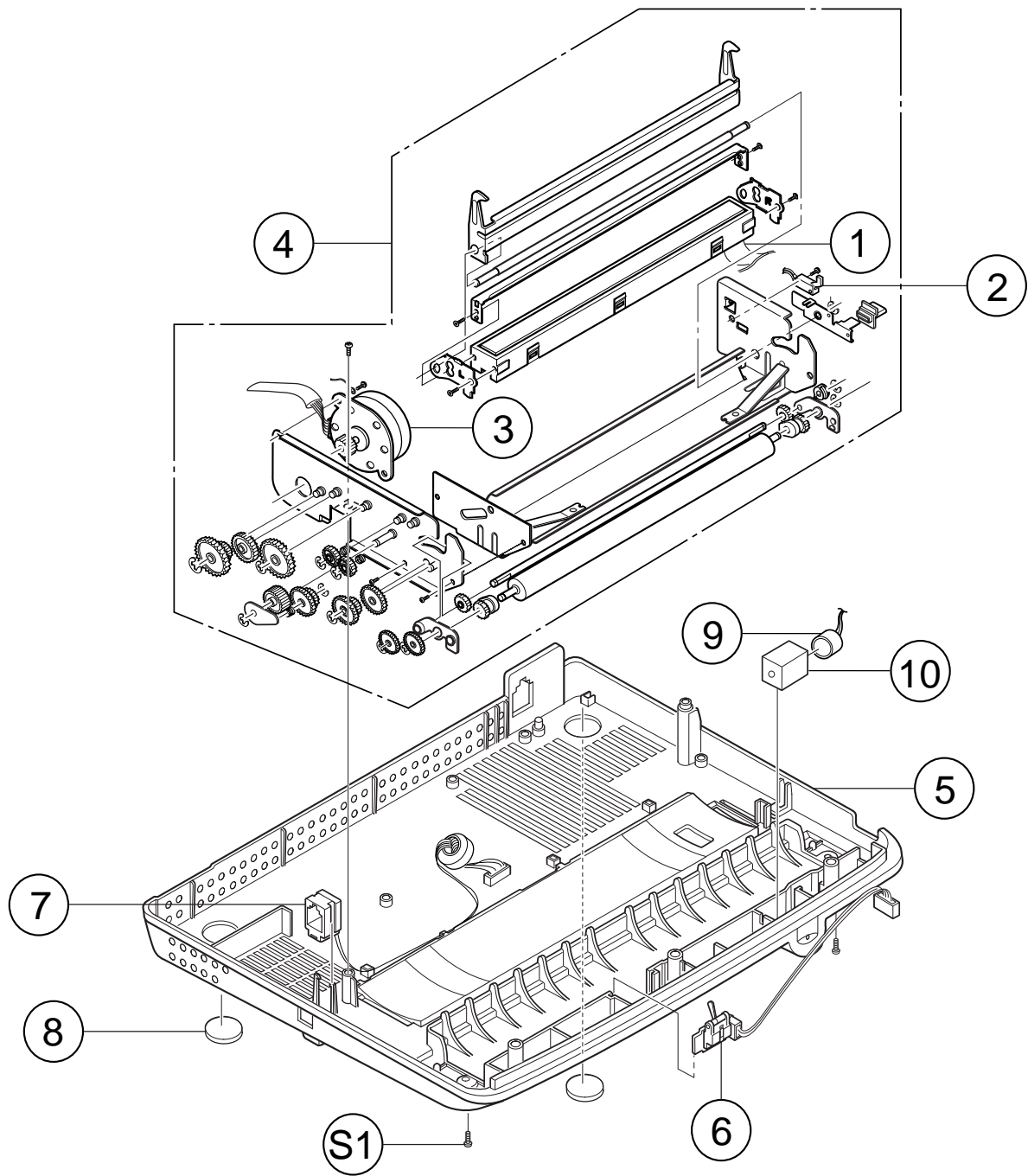
8-4. Ass'y Handset



Ass'y Handset Parts Lists

	Location No.	Description	SEC. Code	Q'ty	Remark
		ASS'Y-HANDSET	JF96-01262A	1	
	1	HANDSET-LOWER	JF72-42014A	1	
	2	AUDIO-RECEIVER, 160 OHM	3009-001001	1	
	3	HOLD-DUMMY	GB72-40792A	1	
	4	RUBBER-MIC	JF73-40501A	1	
	5	PBA-H/S MIC	JF92-00625A	1	
	6	CBF-HARNESS	JF39-40834A	1	
	7	WEIGHT-BALANCE	JF70-10864A	1	
	8	HANDSET-UPPER	JF72-42013A	1	
	9	RING-OP, ID17, OD35	6044-000138	1	
	S1	SCREW, TAPTITE, PH, +, B, M3,	6003-000168	1	

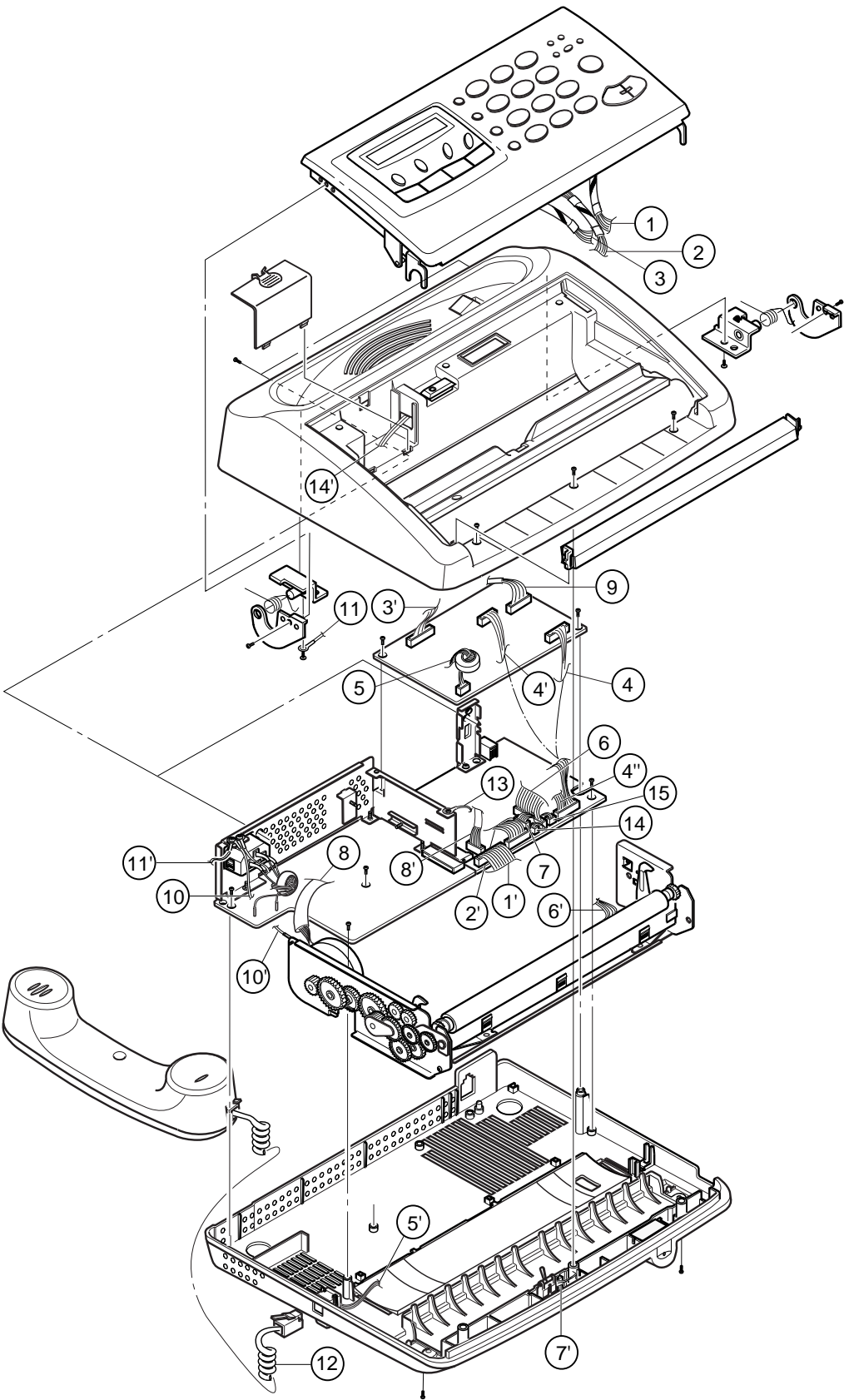
8-5. Ass'y Base



Ass'y Base Parts Lists

	Location No.	Description	SEC. Code	Q'ty	Remark
		ASS'Y-BASE	JF96-01298A	1	
	1	CBF-WIRE, MAIN-CIS/MODE	JF39-41062A	1	
	2	MICRO-SWITCH	3405-000166	1	
	3	STEP-MOTER, 7.5 DEG, 24 V	3101-000171	1	
	4	ASS'Y-MAIN CHASSIS UNIT	JF96-01253A	1	
	5	BASE	JF72-42025A	1	
	6	PBA-D'DET	JF92-00888A	1	
	7	CBF-WIRE, HANDSET-LIU	JF39-41066A	1	
	8	RUBBER-FOOT	JF73-10002A	2	
	9	MIC-CONDENSOR	3003-000120	1	
	10	MIC-ADAPTER	GB72-40770A	1	
	S1	SCREW, TAPTITE, BH, +, M3, L6	6003-000261	2	

8-6. Harness

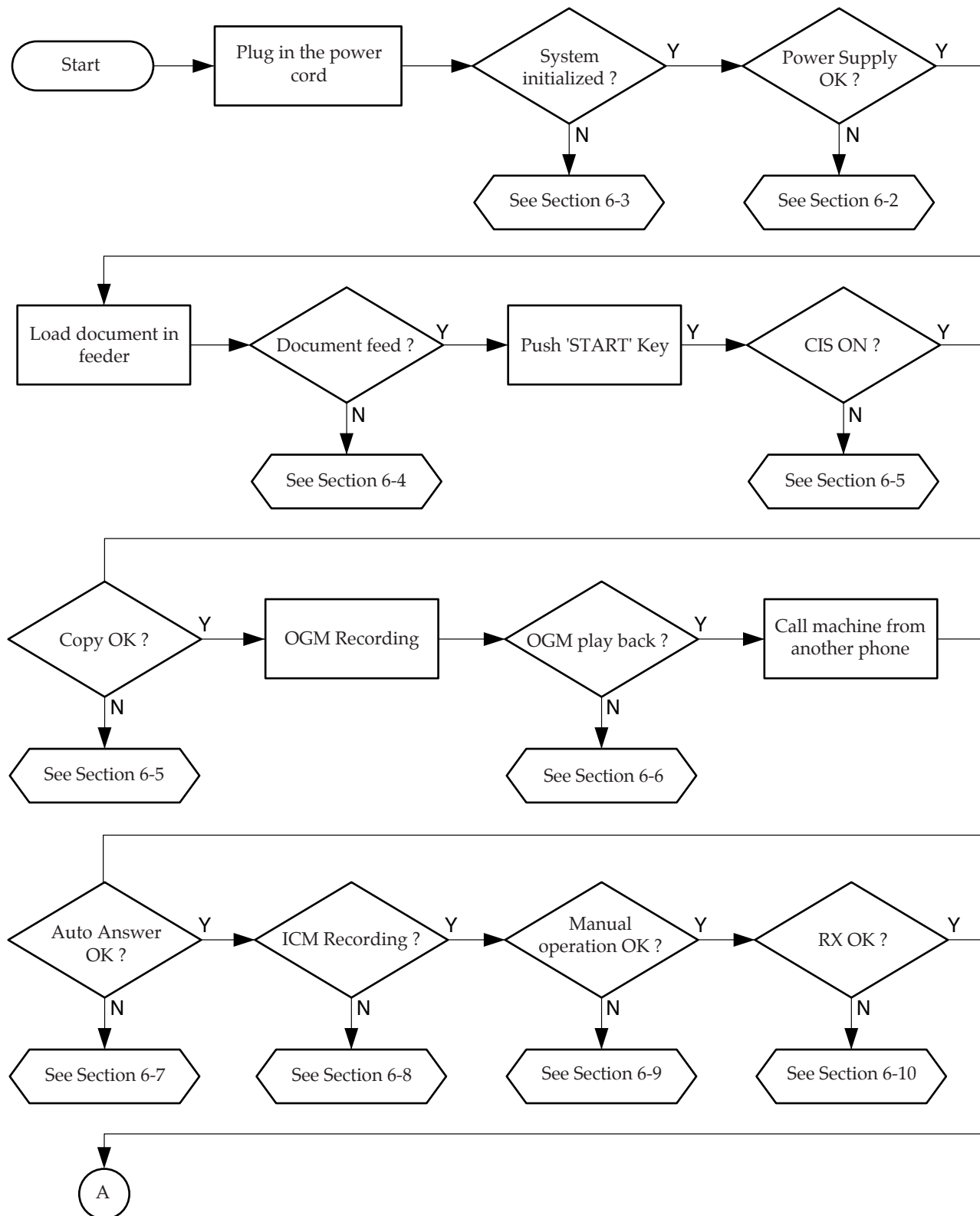


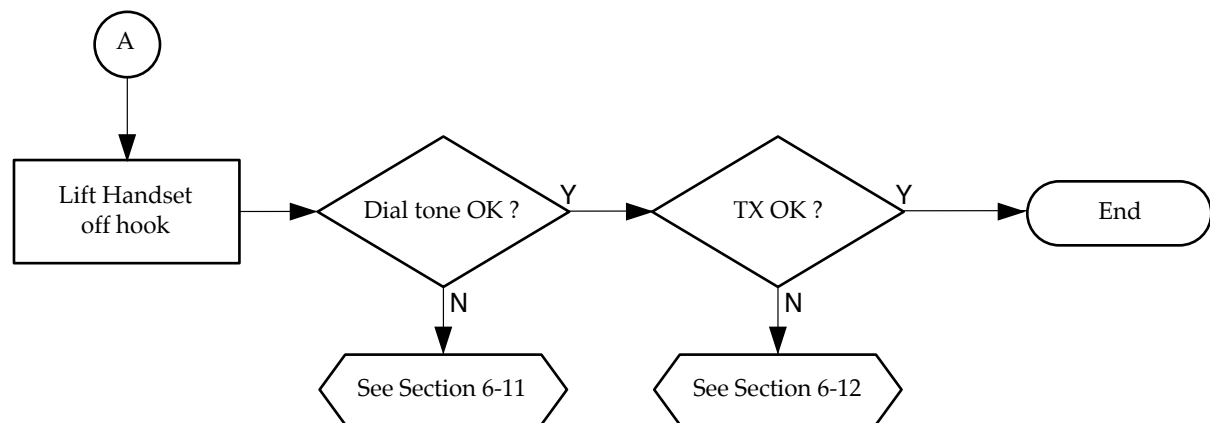
Harness Parts Lists

	Location No.	Description	SEC. Code	Q'ty	Remark
	1	CBF-WIRE, MAIN-TPH, 14 P	JF39-40955A		
	2	CBF-WIRE, MAIN-OPE, 18 P	JF39-41081A		
	3	CBF-WIRE, LIU-OPE, 7 P	JF39-40957A		
	4	CBF-WIRE, MAIN-LIU, 22 P	JF39-41063A		
	5	CBF-WIRE, LIU-HANDSET	JF39-41066A		
	6	CBF-WIRE, MAIN-CIS/MODE	JF39-41062A		
	7	CBF-WIRE, MAIN-D.DET, MIC, 5 P	JF39-41078A		
	8	STEP-MOTER, 7.5 DEG, 24 V	3101-000171		
	9	CBF-WIRE, LIU-HOOK	JF39-41080A		
	10	CBF-WIRE, POWER-MOTOR	JF39-40963B		
	11	CBF-WIRE, POWER-TOP COVER	JF39-40962B		
	12	CURL CORD	JF39-60075A		
	13	CABLE CLAMP	6502-001026		
	14	CBF-WIRE, MAIN-BATTERY, 2 P	JF39-41082A		
	15	CBF-WIRE, MAIN-SPEAKER, 2 P	JF39-41079A		

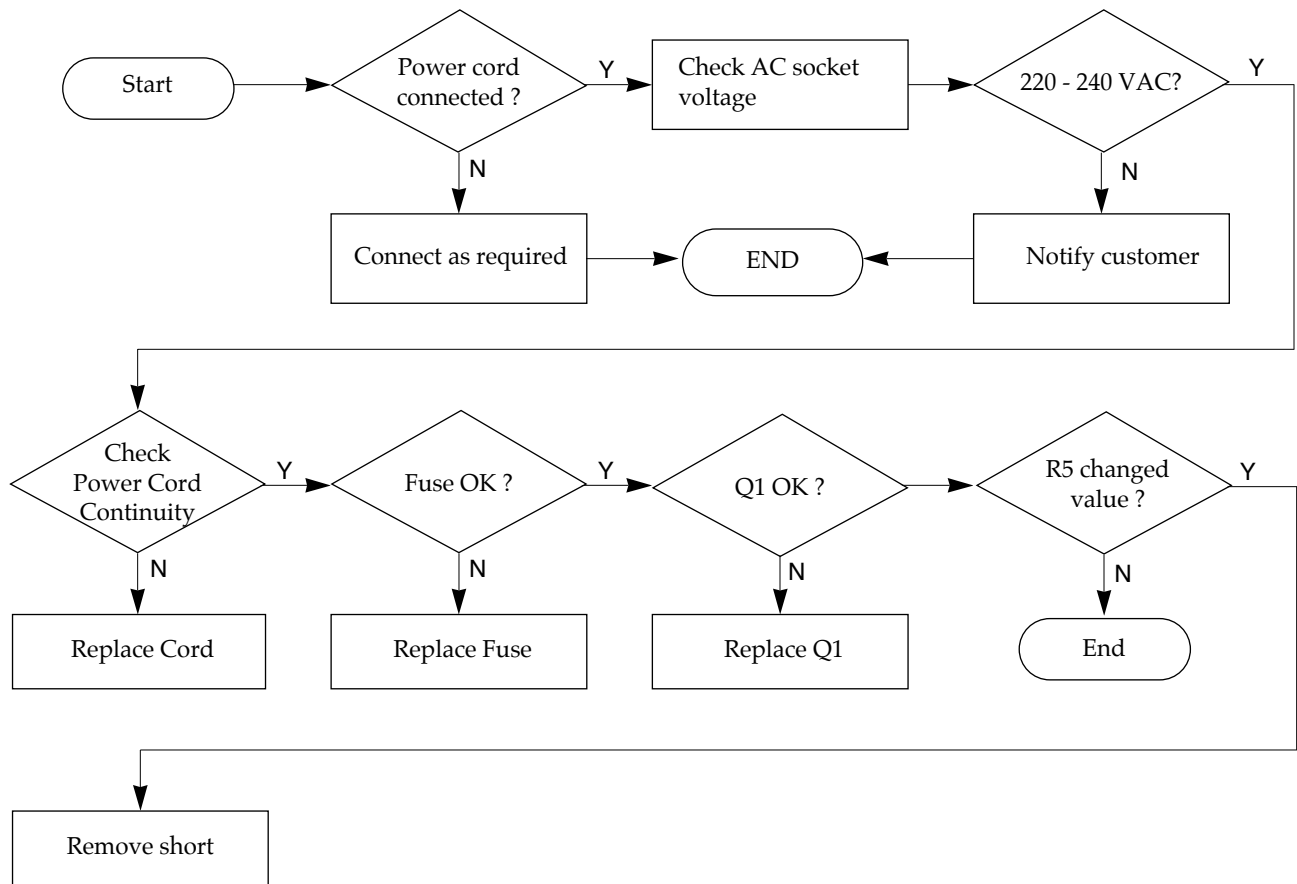
6. Troubleshooting

6-1. Initial Checkout and Overall Troubleshooting Flow

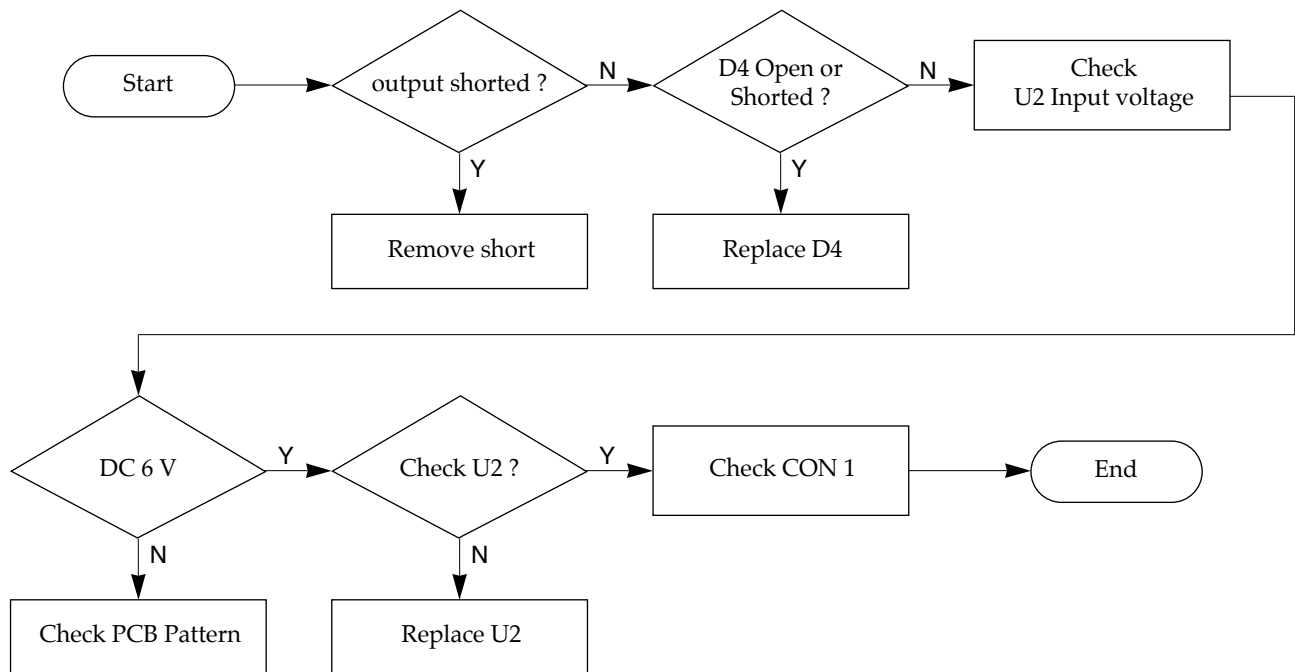




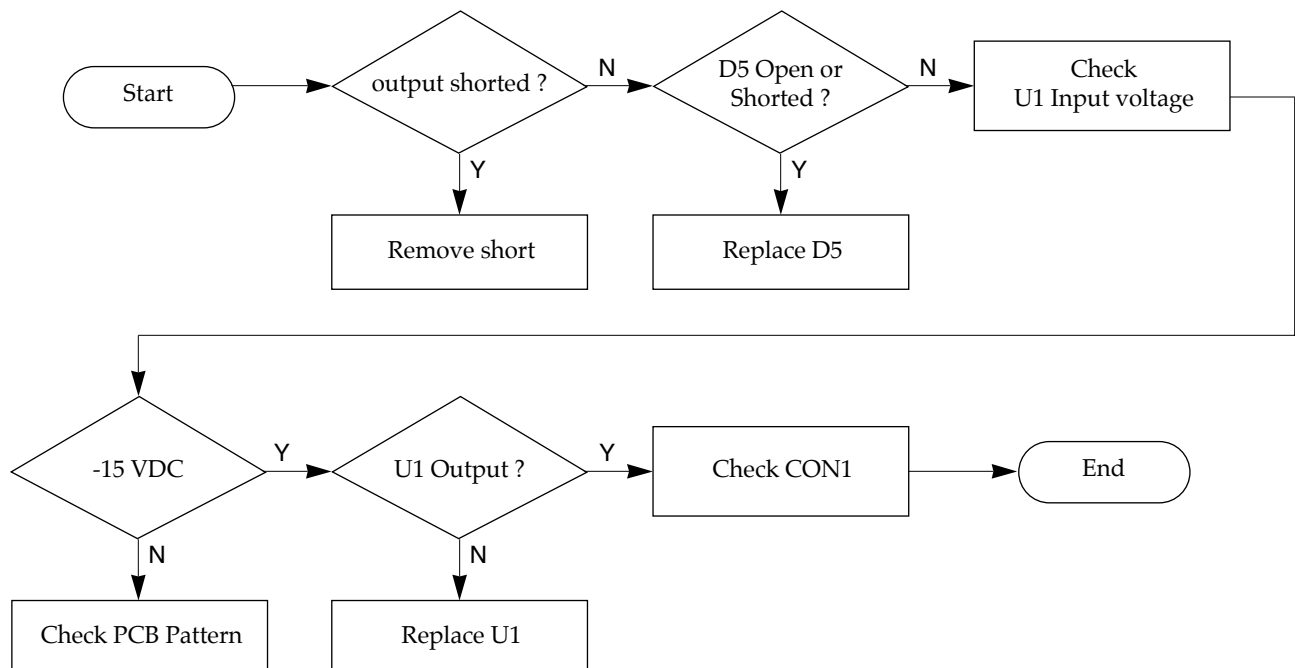
6-2. Check Power Supply



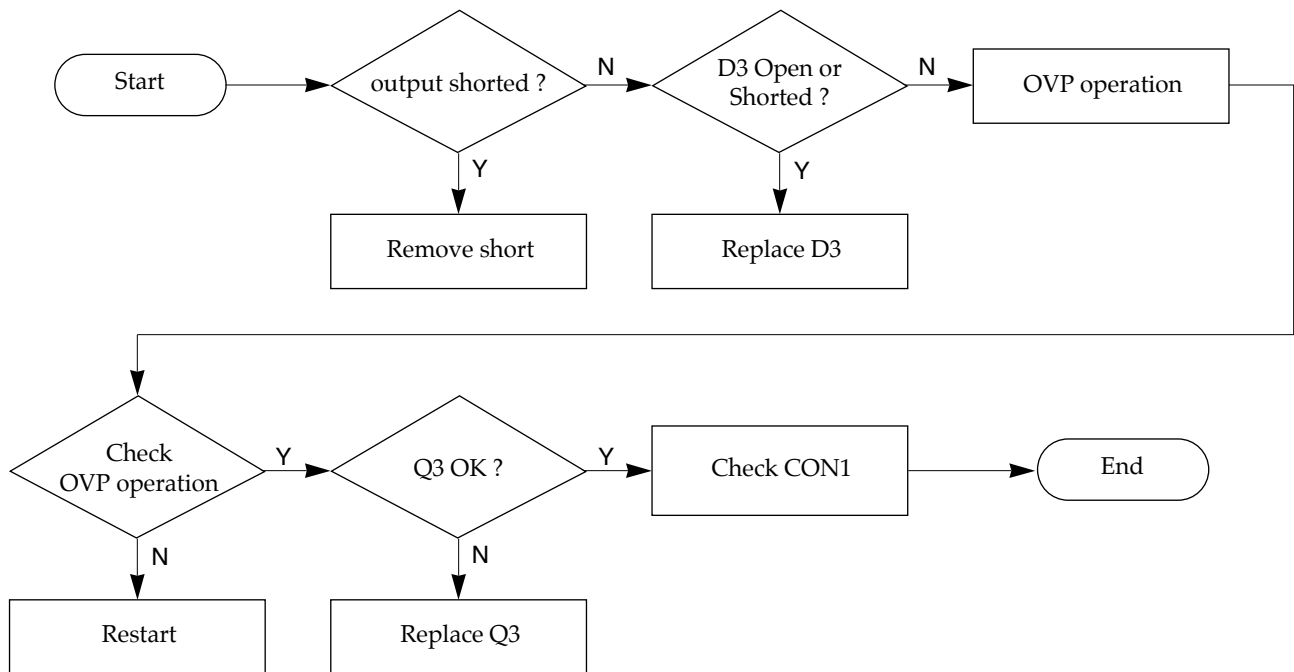
6-2-1 No +5 V



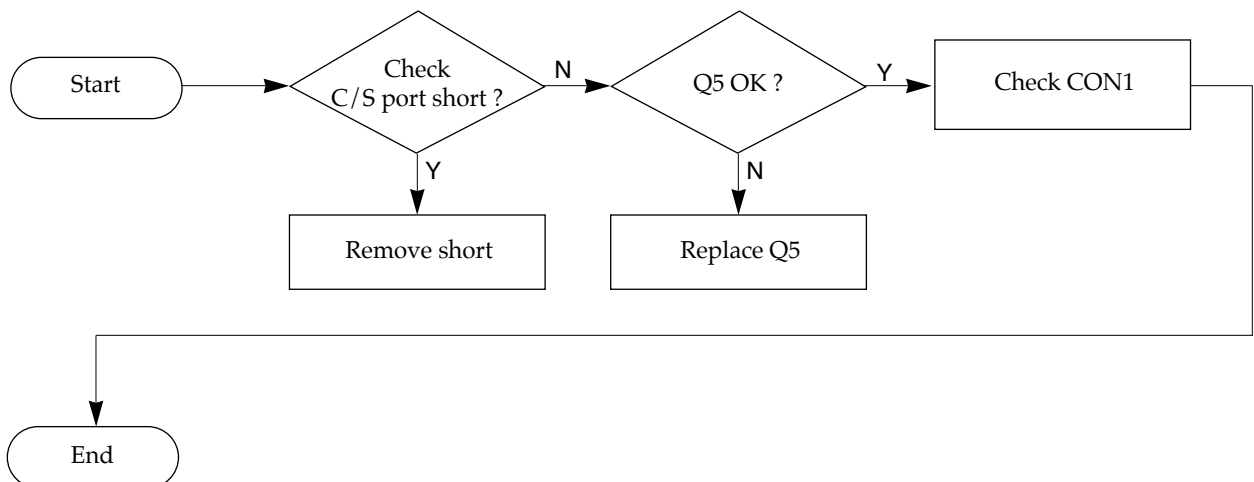
6-2-2 No -12 V



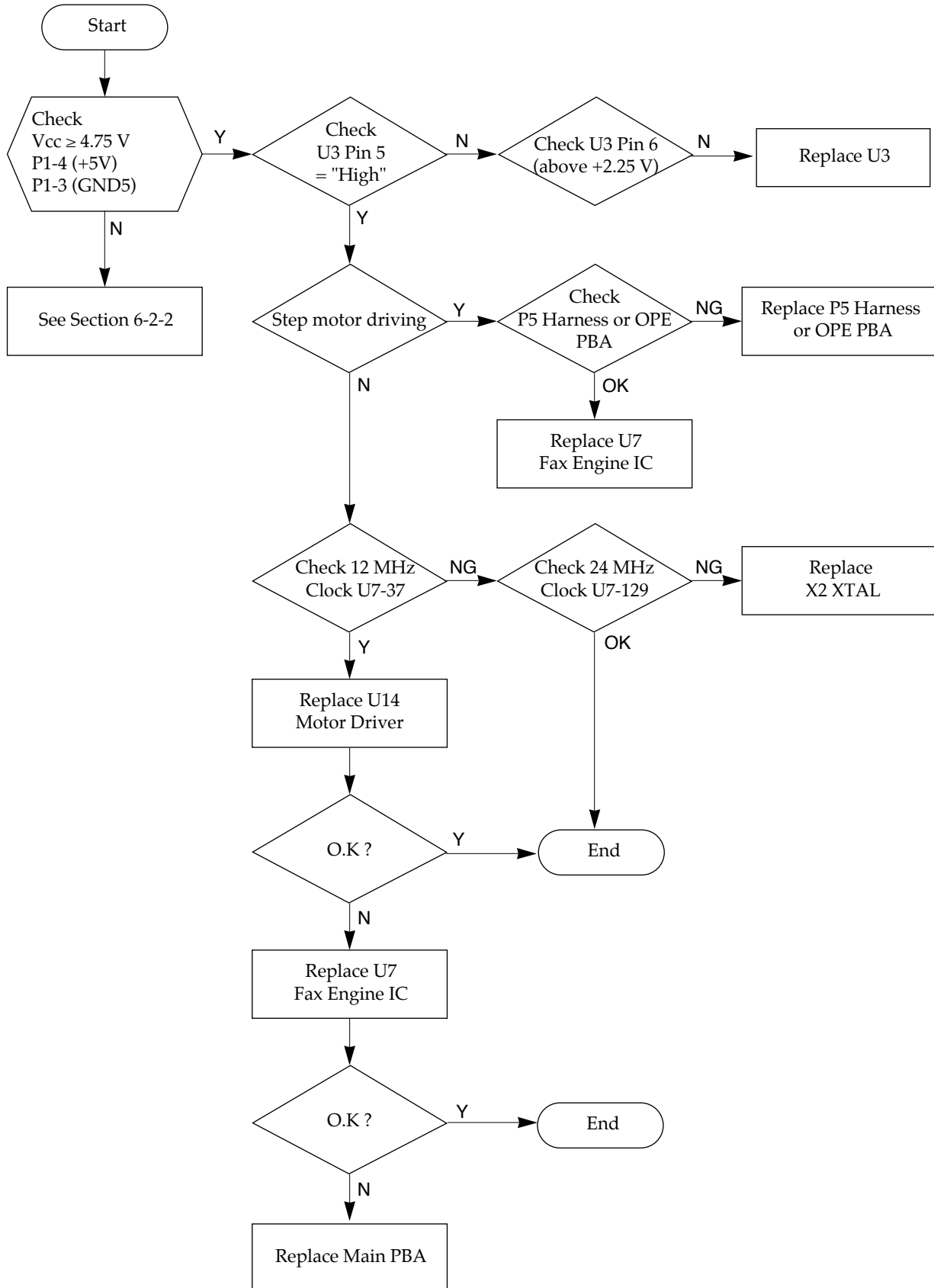
6-2-3 No + 24 V



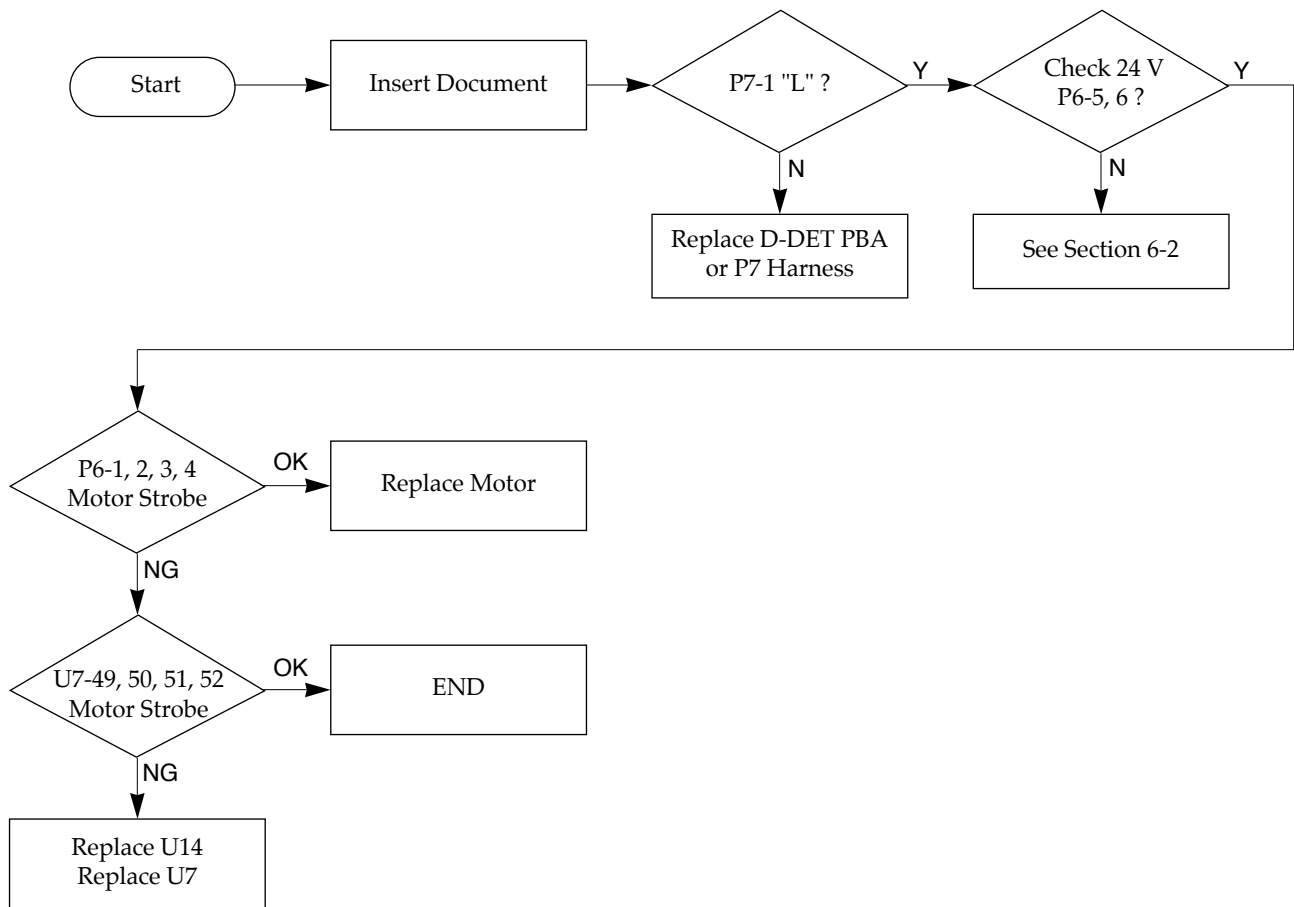
6-2-4 + 24 V TPH Doesn't output



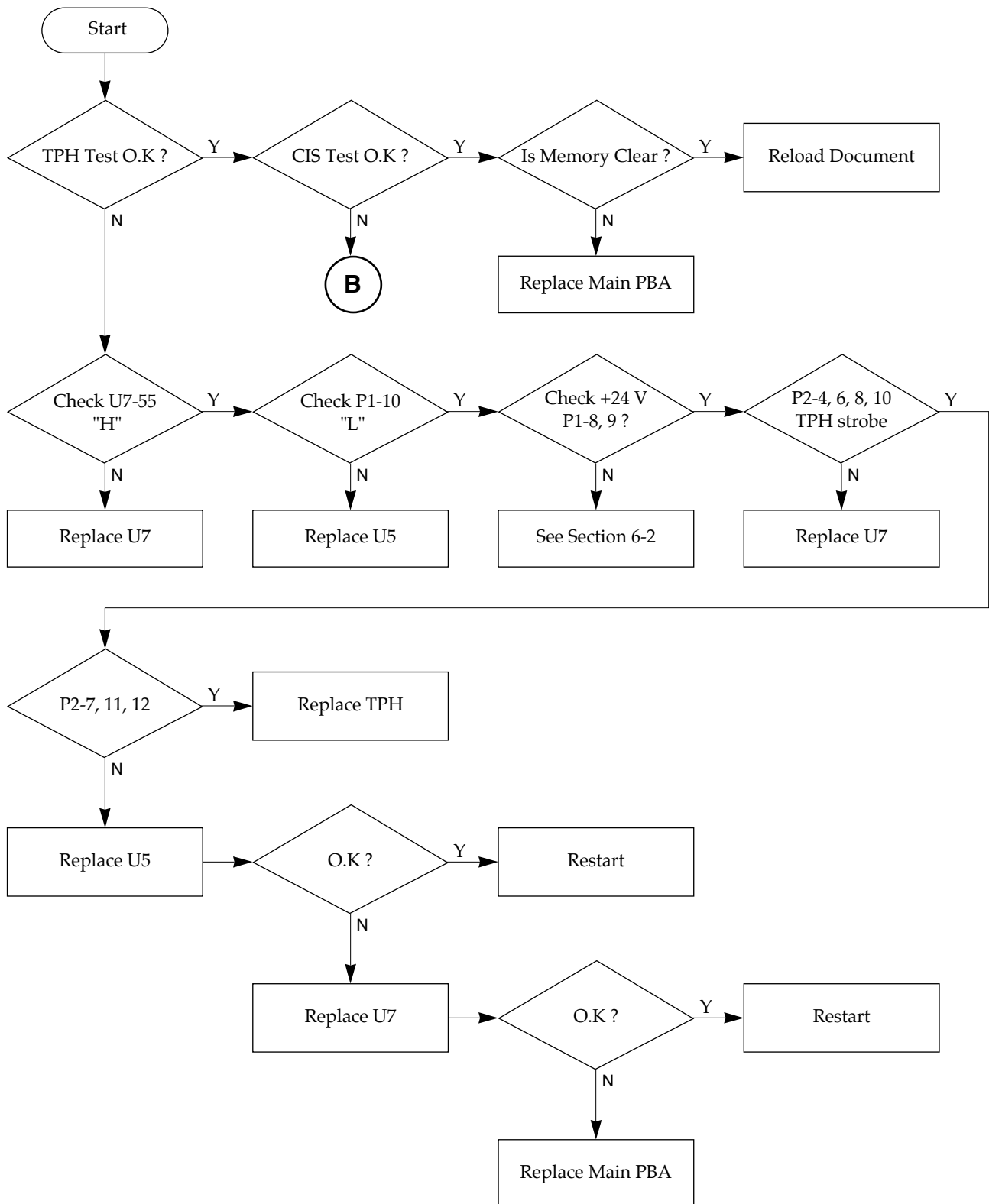
6-3. System Not Initialized

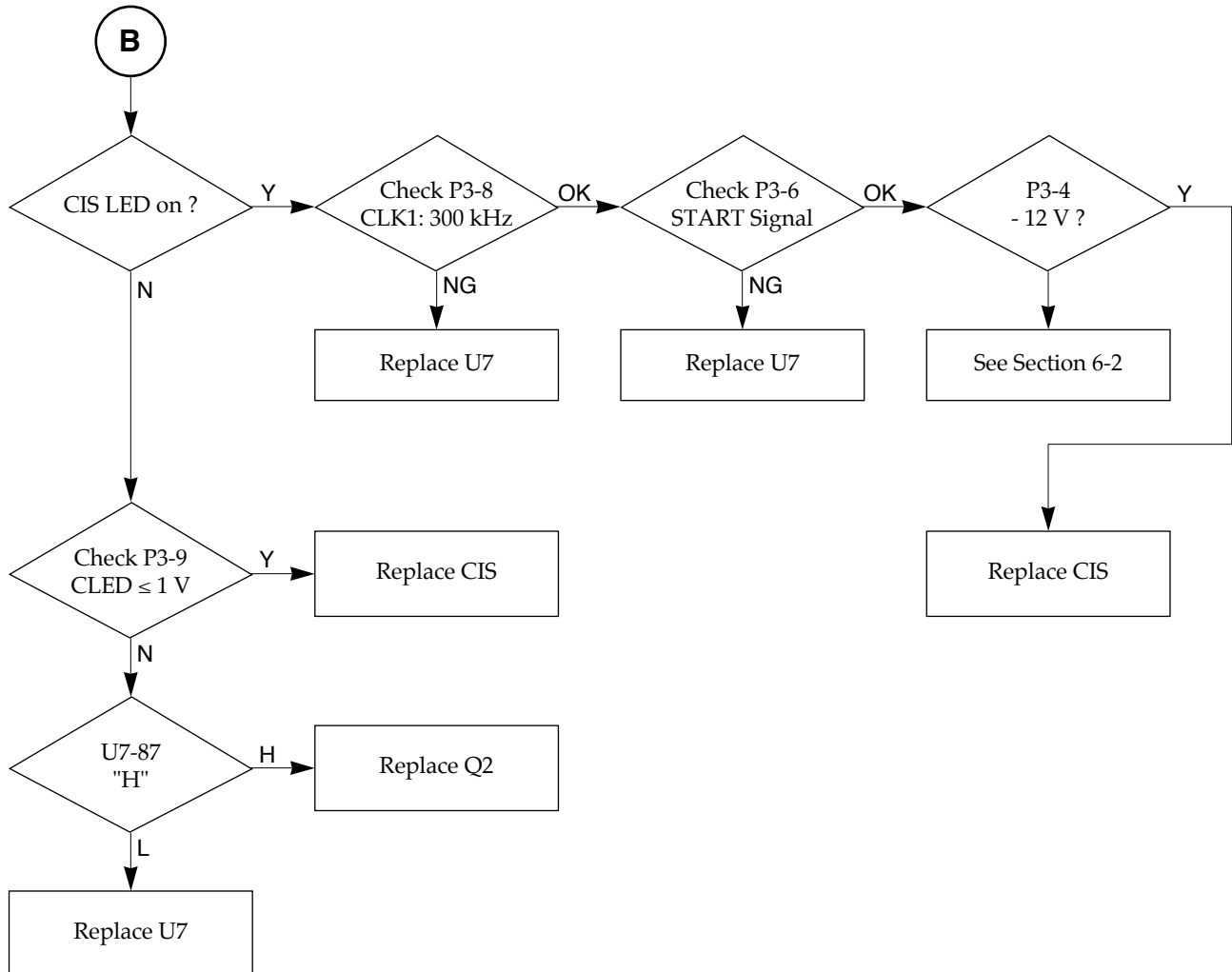


6-4 Document Not Loading

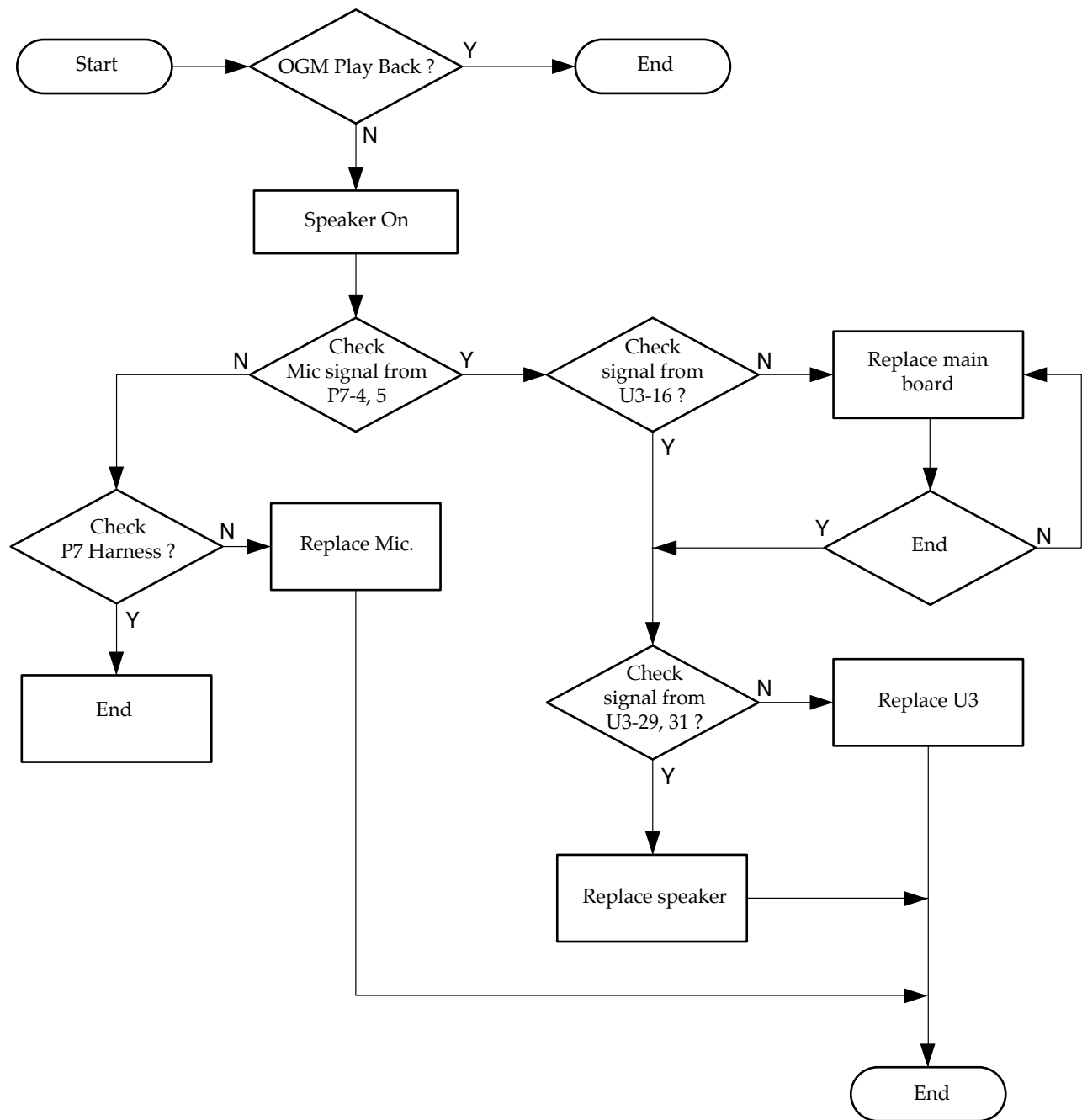


6-5 No Copy Mode Operation

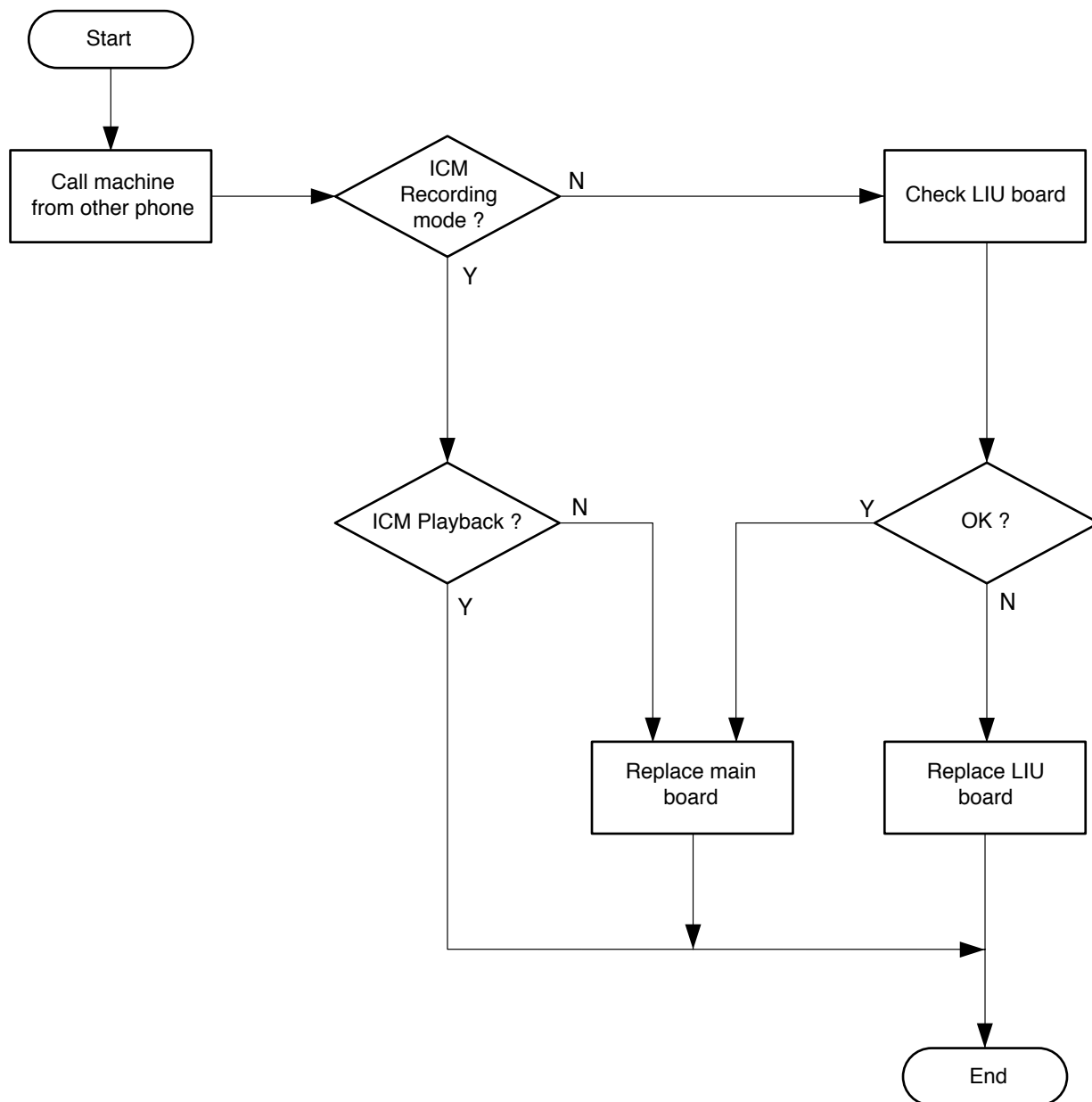


6-5 Continued

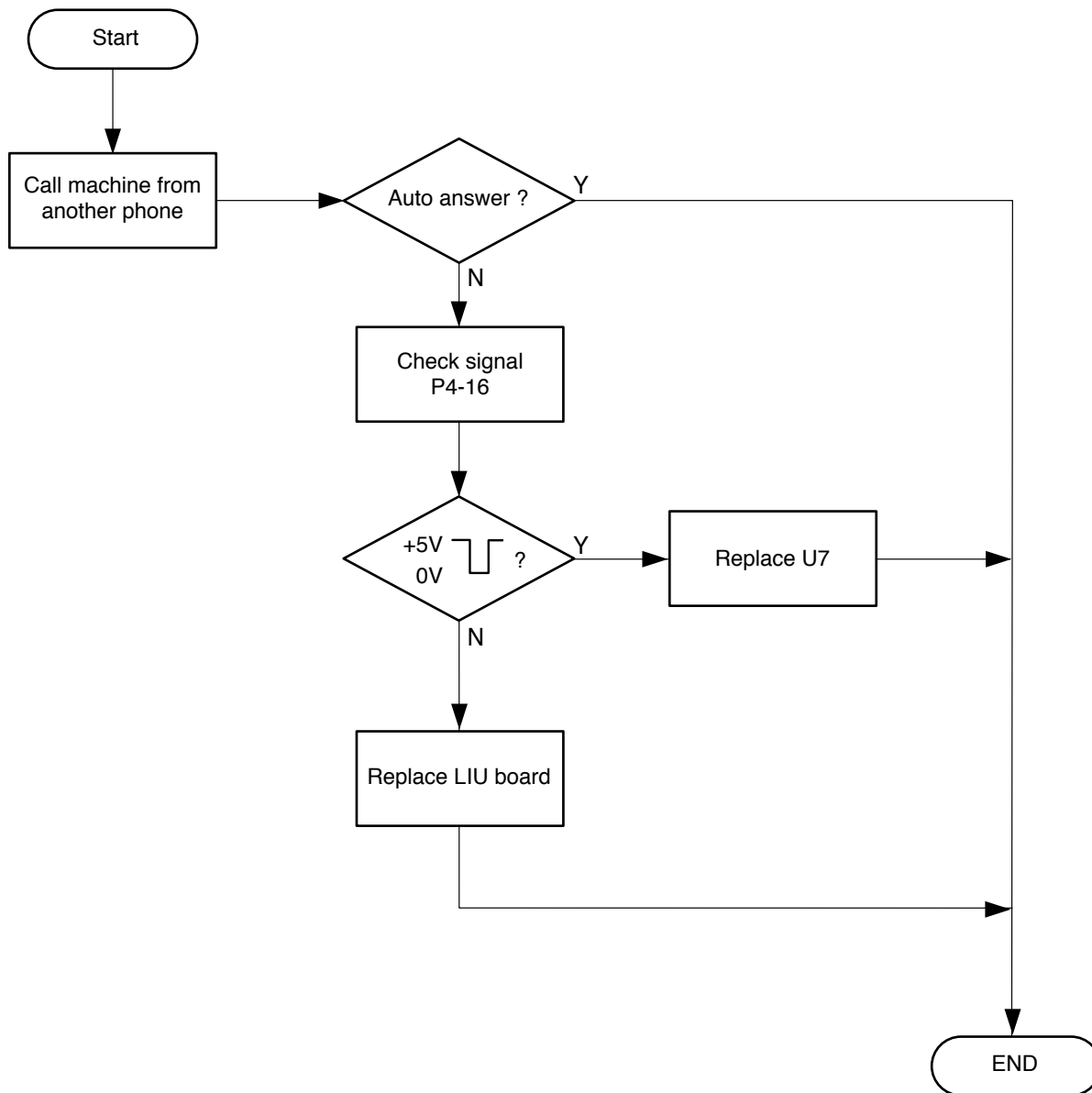
6-6. OGM Not Playing Back



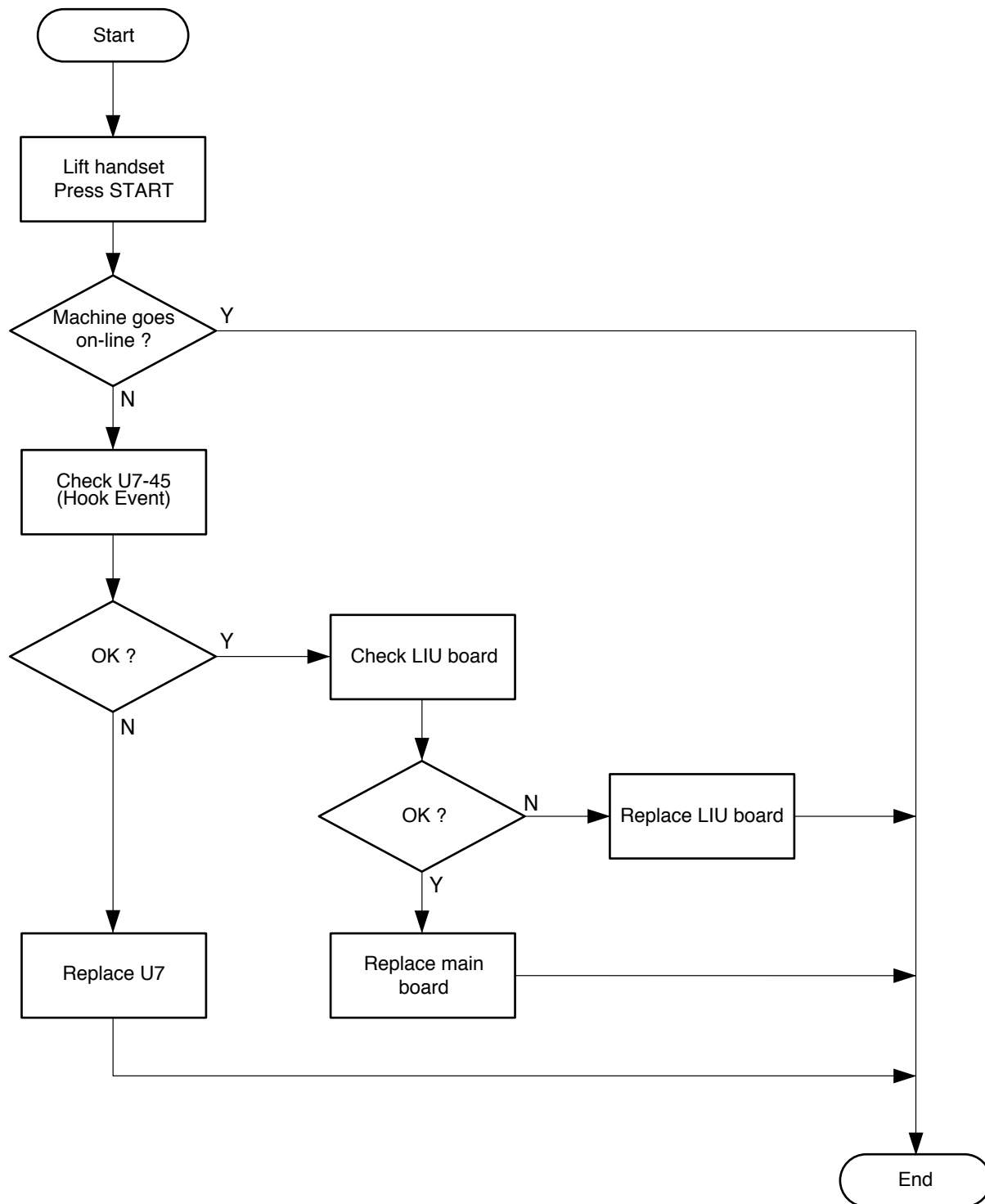
6-7. ICM Not Recording



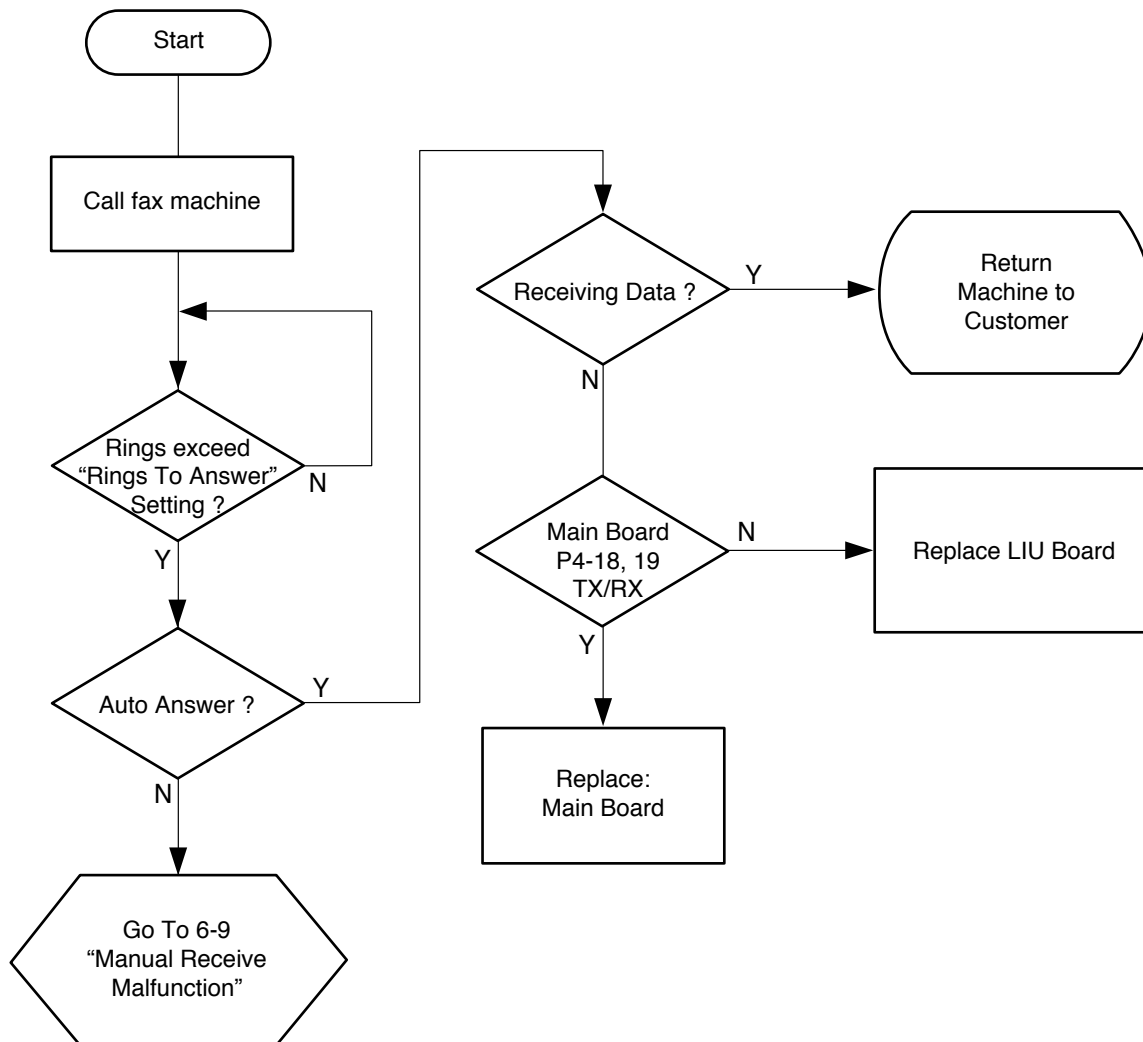
6-8. Malfunction in Auto Answer



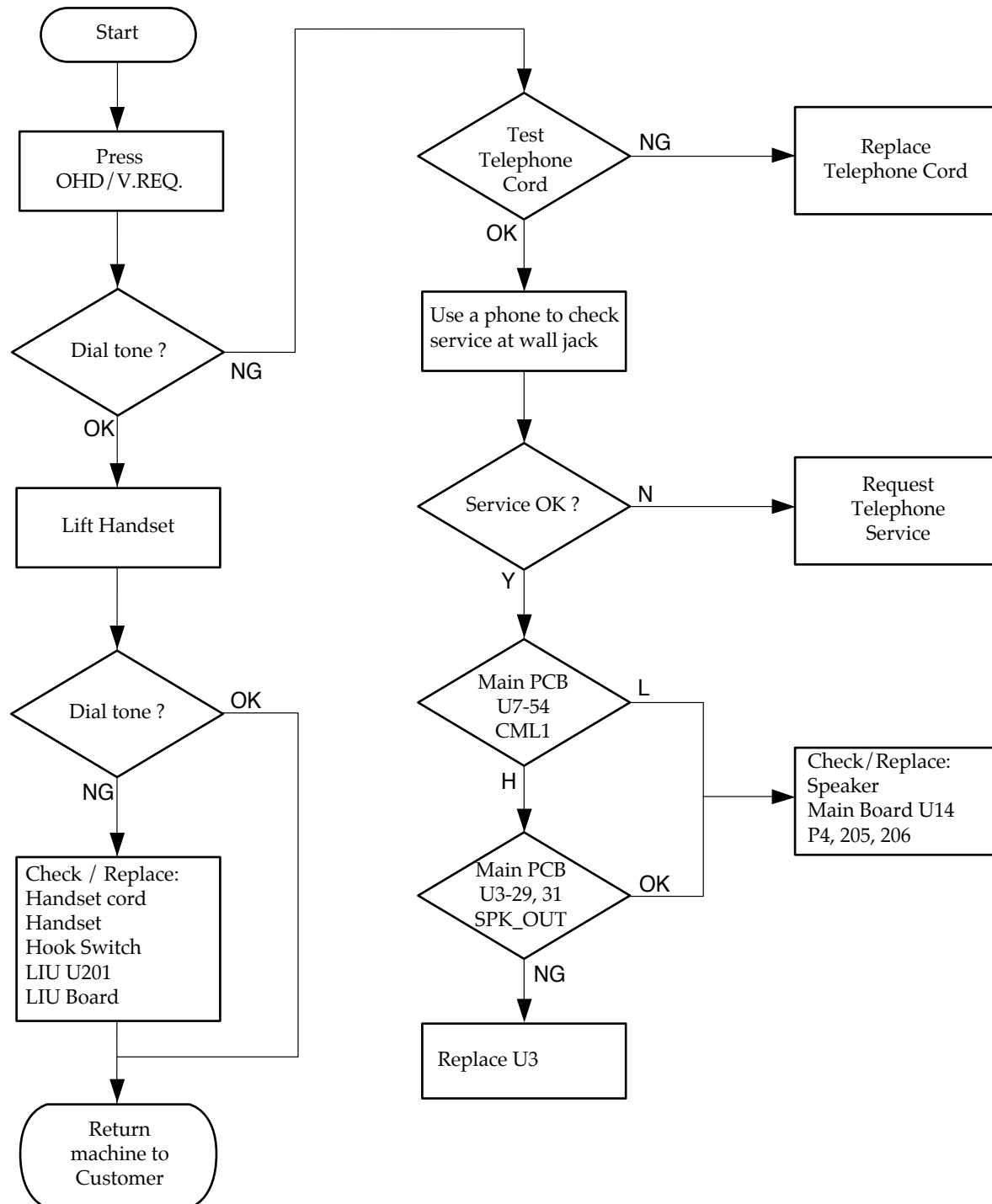
6-9. Malfunction in Manual Receiving



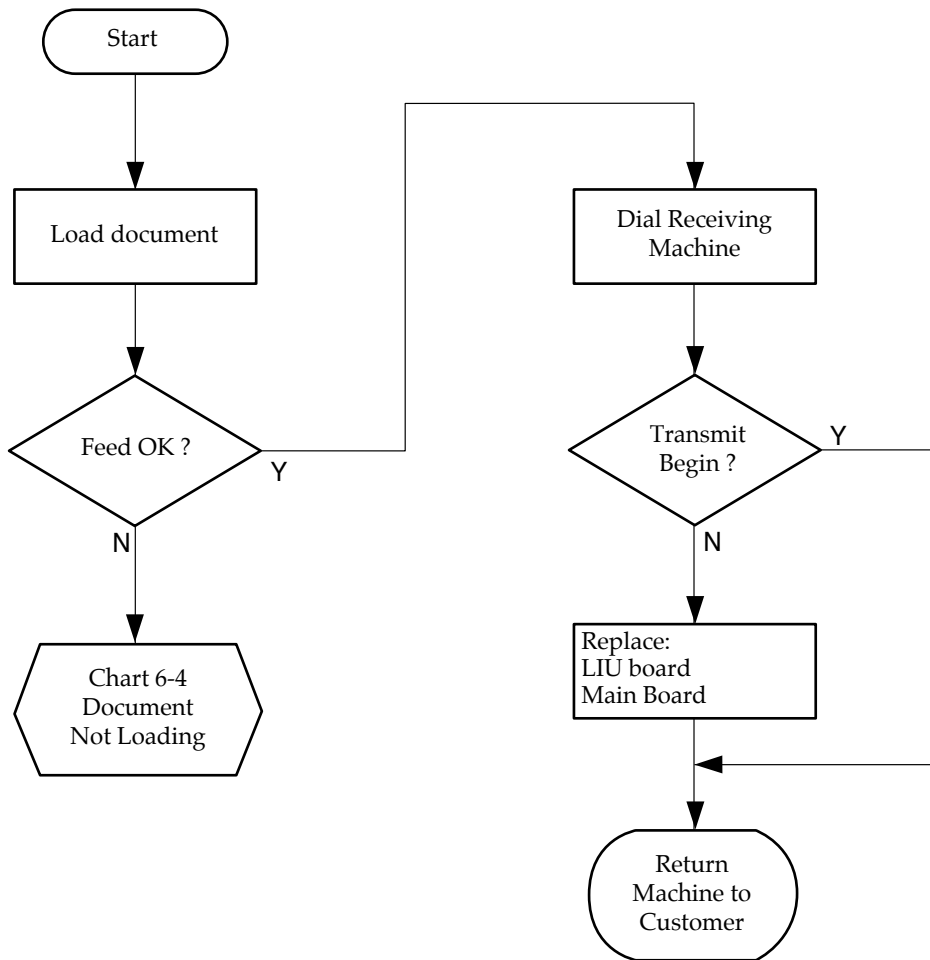
6-10. Automatic Receive Malfunction



6-11. No Dial Tone



6-12. Transmit Failure



5. Circuit Description

5-1 General

The main circuit board controls the machine, and consists of Super Fax Chip (KS16118), External memory, CODEC circuit with modem-TX and RX signal path and some parts of the Line Interface Unit, Digital TAD circuit with DSP and DRAM, which controls the system.

5-2 System Control Section

This circuit consists of the EP-ROM and SRAM, external Real Time Clock crystal, RTC and memory back-up circuitry, and the Super Fax Chip (KS16118).

The KS16118 Super Fax Chip is an integrated 9600 bps modem, image processor, 8-bit MPU, peripheral controller, and analog front end circuit on a single-chip.

Peripheral functions include 2-channel SI0, 3-channel DMA, 6-bit Half flash A/D converter, scanner and video processor units, TPH interface, CODEC unit, and tone generator.

Modem is a 9600 bps, half duplex monolithic device incorporating digital filters, a Samsung SSP1600 digital signal processor and CPU-Interface logic.

5-2-1 Memory Map

The external memory of the CPU is divided into, 1 byte(FF00H) DSP chip select, 32kbyte SRAM (0000H through 7FFFH) and 128kbyte EP-ROM (0100H through 1FFFFH).

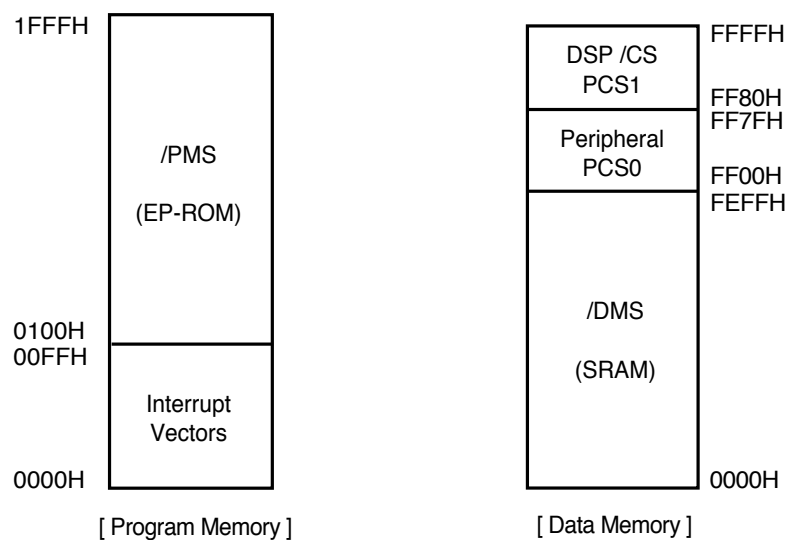


Figure 5-1: KS16118 External Memory Map

5-2-2 External Chip Control

KS16118 internal logic generates chip select signals for both memory chips and peripherals.

To support external access, from one to three wait cycles can be inserted under program control during external access.

A chip select signal line goes active (low) whenever its corresponding device is accessed over the external interface. The peripheral addresses are located in data memory space.

/DMS : SRAM chip select active (low)
 /PMS : EP-ROM chip select active (low)
 /PCSn : Peripheral chip select active (low)
 D0 - D7 : 8 bit data bus
 A0 - A15 : address bus

5-2-3 System Clock

The 12 MHz internal system clock frequency is generated by dividing the 24 MHz clock.

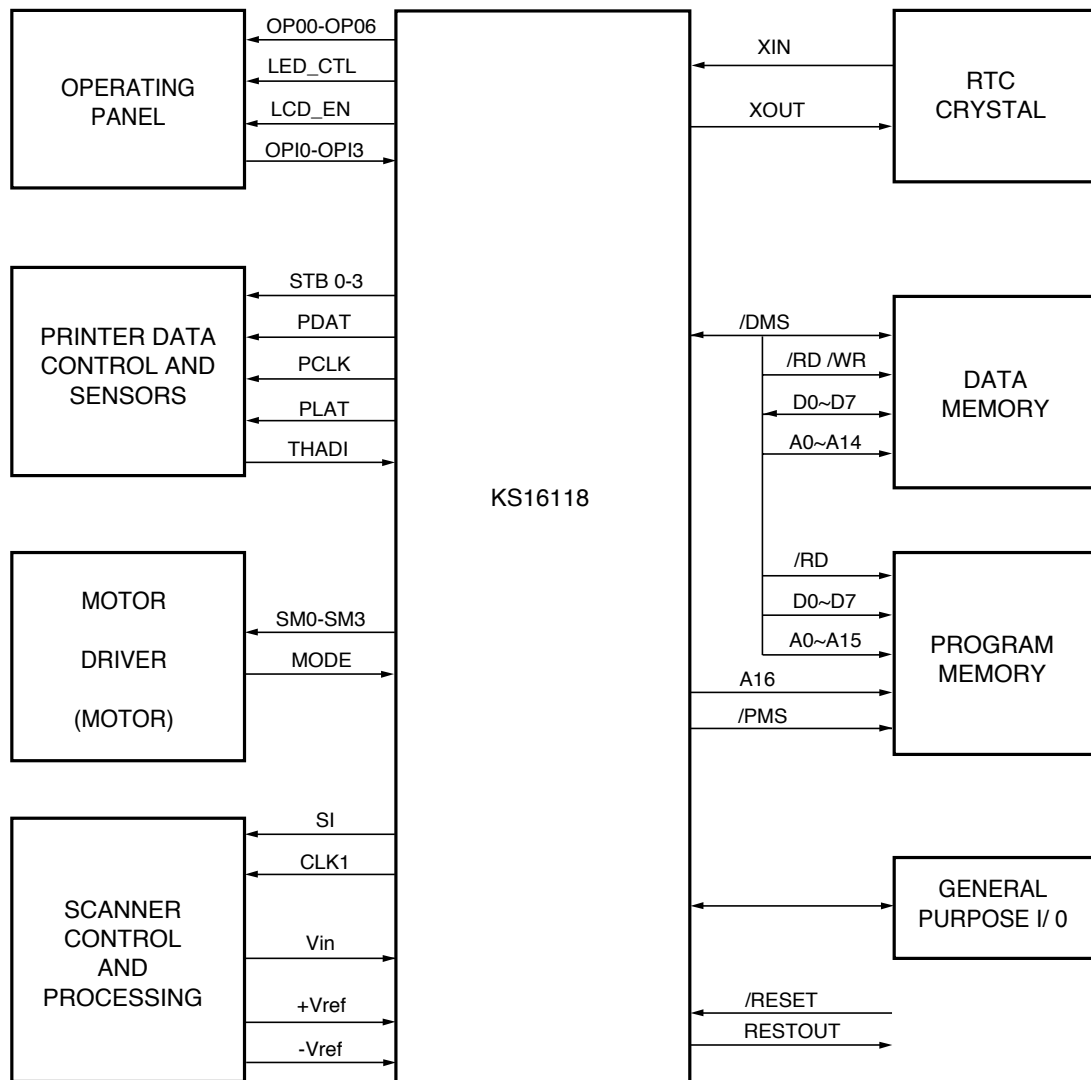


Figure 5-2: XFC Hardware Interface Signals

5-2-4 Real Time Clock (RTC)

This circuit receives clock pulses from an external 32.768 kHz crystal, which it divides into hours, minutes, seconds, year, month, and day. A battery maintains operation when power is off. KS16118 can up-track 100 years, beginning with 1992.

5-2-5 Print Control

The PCLK and PDATA signals synchronize serial print data to the TPH. PLAT latches TPH serial print data to the TPH from a shift register through PDATA. STB0 - STB3 enable TPH printing in four steps. This system has a 10ms/line printing format and sets STB High/Low enable status according to the STBPOL signal.

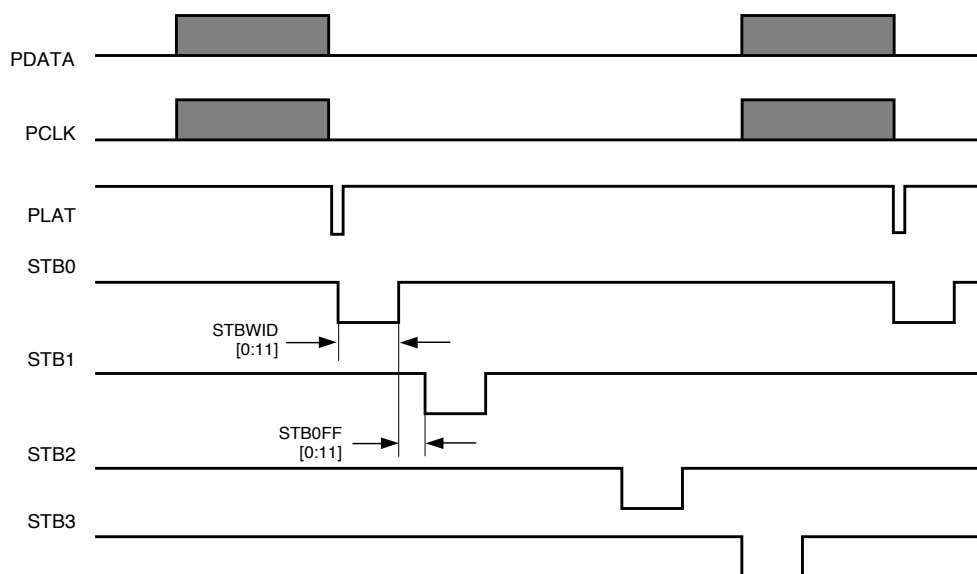


Figure 5-4: Printer Timing

5-2-6. A/D Converter (Scanner & TPH Temperature)

Using a half-flash conversion technique, the 6-bit A/D converter supports a $0.8\mu\text{s}$ peak conversion time and dissipates only 7mA, maximum.

The half-flash unit uses 16 comparators, a most significant 3-bit ADC, and a least significant 3-bit ADC.

If the analog input voltage is greater than +Vref, the A/D conversion result is 3FH.

If the analog input voltage is less than -Vref, the A/D conversion result is 00H.

A/D conversion register, ADCON (19H), is used to select an internal or external source for the A/D converter, to enable or disable the converter, and to select the operating mode (H: ADin 1 (Scanner), L: ADin 0 (TPH)).

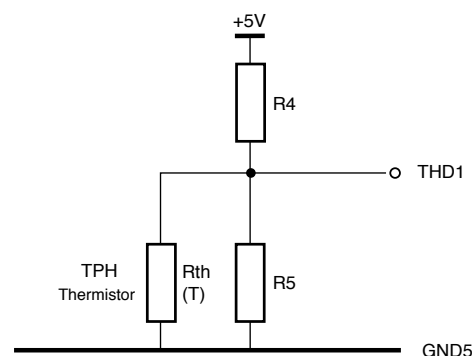


Figure 5-6: THD Connection Circuit

5-2-7 Operation Panel Control Communication

The Operation Panel is controlled by the Port 1, Port 2, and Port 5 registers.

Port 1 (E2H) is a 4-bit general output port for LCD display data.

This port can be configured for normal data (P1.4-P1.7) or alternately as internal MODEM V.24 interface output signals (P1.0-P1.3).

Port 2 (E4H) is an 8-bit port with both input and I/O pins.

P2.0-P2.3 are input ports for OPE key scan data, and P2.6-P2.7 are not used for SF150T.

Port 5 (EAH) is an 8-bit port with both output and I/O pins.

P5.0 and P5.4 are used for LED control and LCD enable.

5-2-8 Image Sensor

The shading wave is formed by scanning the white roller prior to a document.

The slice level is determined by the shading wave, and compensates for shading distortion according to the CIS characteristics.

The wave format from the CIS is converted into a 6 bit digital value in the KS16118 image processor, and processed in B/W or intermediate mode.

5-2-9 CIS Input Processor

To process the B/W input signal, maximum (+Vref) and minimum (-Vref) values of the CIS input signal are adjusted by calibrating KS16118 in the high state for maximum level, and setting them to earth for minimum level.

Shading correction uses a multiplier composed of a 9-bit sequential adder for simple H/W Logic.

5-2-10 CIS Driver

The CIS driver clock (CLK1) frequency is 250 kHz. A 75% low duty cycle lengthens the charging time. A start signal (SI) is provided every 10 ms to match the line scanning time.

Actual image signal (VIN) is provided in less than 6.8 ms, based on A4 paper size using the 250 kHz clock.

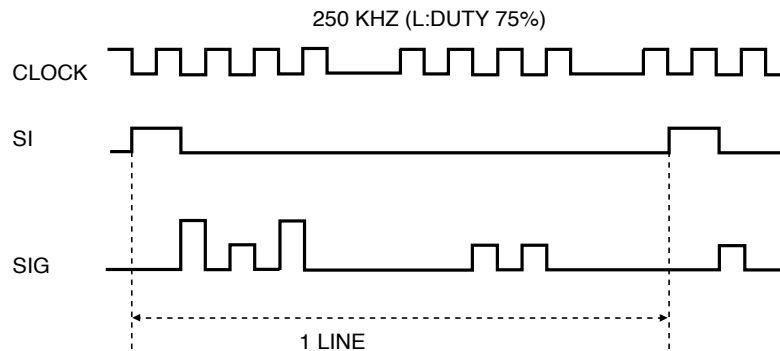


Figure 5-10: CIS Driver Clock Timing

5-2-11 I/O Port Table

Pin No.	Port Name	Circuit Symbol	I/O	High	Low
34	P0.0	A16	O	High Bank Memory	Low Bank Memory
35	P0.1	/DSP_CS	PCS	DSP Inactive	DSP Active
45	P2.4	IRXD	I	DATA = 1	DATA = 0
46	P2.5	ITXD	O	DATA = 1	DATA = 0
49	P3.0	MOTOR A	O	Active	Inactive
50	P3.1	MOTOR /A	O	Active	Inactive
51	P3.2	MOTOR B	O	Active	Inactive
52	P3.3	MOTOR /B	O	Active	Inactive
53	P3.4	/CML2	O	-	-
54	P3.5	/CML1	O	Active	Inactive
55	P3.6	/24VCTL	O	Active	Inactive
93	P4.1	DSPRST	O	DSP Reset	Normal
92	P4.2	DSPHL	O	DSP High Byte	DSP Low Byte
90	P4.4	/LOWBAT	I	Normal	Low Battery
89	P4.5	DSPACK	O	Normal	DSP Response Mode
87	P4.6	/GLED	O	CIS LED On	Off
88	P4.7	-	O	High	Low
126	P5.0	LEDCTL	O	OPE LED On	OPE LED Off
96	P5.3	/NOBAT	I	Normal	No Barttery
137	P5.5	SCLK	O	CODEC Serial Clock	
138	P5.6	SDATS	O	CODEC Serial Data	
139	P5.7	/SDEN	I	Normal	CODEC Enable
59	P6.1	/HOOK DET2	I	-	-
60	P6.2	MODE	I	Open	Closed
61	P6.3	P_EMPTY	I	No Paper	Paper Exist
62	P6.4	D_DET	I	No Document	Document Exist
63	P6.5	RING_DET	I	Normal	Incomming Ring
116	P6.6	/DSPFLAG	I	Normal	Active DSP Data Transfer

5-2-12 Motor Controller

This facsimile machine perform sending, receiving, and printing functions utilising a single 24 volt motor with a 120 ohm winding resistance. Four drive strobe pulses operate the motor.

Motor Function	Drive Strobe Pulse	Phase
Swing Gear Control	100 pps	2
Document Out	100pps	2
Super Fine Mode	100pps	1-2
Other	100pps	2

Table 5-1: Motor Functions

5-2-13 Serial communication Signals

The KS16118 have two full-duplex serial communication port. One port is used for I-LIU communication on LIU PBA, and is a standart UART (Universal Asynchronous Receiver/Transmitter). Another port, not used, may be configured for UART or SRT (Synchronous Receiver/Transmitter) operation.

5-2-14 Reset

To initialize the chip's internal logic, the reset input (/RESET) must be held to 0 Volt for at least 22 CPU clocks. During this time, Vdd must be greater than 3 Volt.

The watchdog timer can also invoke a system reset.

When the reset input is released, the reset condition continues for about 209.7 ms.

While the KS16118 is in this state, 0 Volt is applied to the /RSTOUT pin.

[+5V Power Monitoring]

If 5 volt power to MX93000AFC's pin 6 (VPOW) drops to between 4.6V and 4.4V (typically 4.5V), power failure is indicated and the output of MX93000AFC's pin 5 (/POWB) will go 'low'(GND5). This causes the KS16118 to become active (low=reset). The KS16118 reset causes the /REST0 terminal to be reset.

5-3 Memory

System memory consists of 128 kB EP-ROM and 32 kB SRAM. All of SRAM is backed up. ROM and SRAM are selected by chip select lines, and data is accessed by the units position of the byte. ROM has two banks. One Bank is as low bank that address range is 0100H-FFFFH. Another bank is as high bank 10000H-1FFFFH. ROM's bank is selected port 0 (bit 0) of the KS16118. 5V power is applied to SRAM through VB. This model facsimile machine uses a Lithium battery. A 1 kohm resistor in series with the positive battery terminal is for battery protection.

5-4 CODEC circuit with Modem-TX and RX signal path

This has PCB CODEC which has ability that converts voice signal to A/D and is able to store in DRAM and convert to voice signal passing through D/A transmission after scanning from voice digital stored in DRAM by DSP. This has PRE-PGA(Programmable Gain Amplifier) that is able to amplify selectively among Mic input, remot signal, rx signal.

This has ALC(Automatic Level Control) circuit has maximum 42dB gain to be convenient for recording using Mic. This have two comparator having 1.25V reference voltage and two universal opamp.

This has 1 W speaker drive amplifier that is able to drive 8 ohm speaker.

Because MX93000AFC's control uses synchronous communication port, that is fast in action is convenient.

1) TX CIRCUIT

The output signal coming from internal modem KS16118 enters MX93000AFC through AUX2 terminal after amplified by OP AMP U1.

That signal passes through internal switch, is amplified by LIN-DRV amplifier and is sent to LIU board through LOUT terminal.

2) RX CIRCUIT

The signal coming into LIU terminal through LIU board is amplified by MX93000AFC's PRE-PGA, passes through internal switch and goes into FILT terminal.

After the signal is diminished by OP AMP U1, it enters internal modem of KS16118.

5-5 TAD

TAD circuit consists of a voice coprocessor to record and play voice messages and voice memory.

5-5-1 DSP

This circuit consists of host interface, memory interface, CODEC interface.

receives data to the compressed voice data to and from KS16118.

Memory interface sends and receives data to the compressed voice data to and from DRAM to play back and record voice data.

DSP communicates with host KS16118 through host interface.

5-5-2 Recording Path

The voltage is supplied with MIC as using the MX93000AFC's Vref Voltage (2.25V), and the voltage entering into MIC is transmitted to electric signal and enters into MX93000AFC's MIC terminal.

Input signal is amplified by MX93000AFC's ALC until maximum 26dB (Max. 3V_{P-P}) according to signal size.

The signal enters into PCM CODEC that converts to D/A and compresses in the DSP Chip and stores in DRAM.

5-5-3 Play Path

The signal stored in DRAM is decompressed in DSP and enters into MX93000AFC.

Input signal is converted to D/A again and is amplified by LIU-DRV amplifier and comes into LOUT terminal through or comes into terminal after being attenuated by ATT (Electronic Volume) or SPK-DRV.

5-5-4 Voice Backup

+5V is supplied for DSP or voice memory through VBT when power is on.

When power is off, +5V is supplied from the 9V backup battery.

When supply voltage is "ON", U9(5V Voltage Regulator) makes 5V Supply Voltage.

The signal is supplied with DSP or DRAM and it caused that the data is protected.

When supply voltage is "OFF", U9 makes 5V Voltage as using the 9V Battery.

And then the voltage is used to "backup supply voltage" in DSP or DRAM.

If the supply voltage were "OFF" as using the full charged 9V Battery, voice data is usually protected for twenty hours.

5-6 LIU PBA

The LIU (Line Interface Unit) interfaces the MODEM and telephone to the telephone line. The FAX and telephone portions of the LIU are active with machine power on. When machine power is off, only the telephone circuitry operates, powered by telephone line voltage. The FAX portion of LIU consists of the interface between MODEM and telephone line; and the circuits for DC loop feeding, DP signal, loop current and ring detect. The telephone portion is divided into ringer, dialling, and speech circuits. Refer to the schematic and connection diagram sections of this manual.

5-6-1 FAX section

MODEM/LINE INTERFACE

This is the path for data and control signals.

- CML201 relay: switches telephone line between FAX and telephone circuits.
- U201 pin 3 TIT: single-ended input for transformer T202.
 - ◆ TIT: Transmit Input from Transformer
- U201 pin 40 ROT : Output for driving a transformer T203 with an AC impedance exceeding 10Kohm.
 - ◆ ROT: Receive Output Transformer
- C212: DTMF and CNG detect path to T201 20Kohm winding under idle conditons; and DC blocking for 20Kohm winding.
- AC impedance: the AC impedance of U201 (I-LIU) is set at 1000ohm by external capacitor C228 at U201 pin 8 CI (Complex Impedance input) port. With an external resistor (R244) at U201 pin 34 ACI port it can be programmed to 600ohm. And U201 pin 35 CS (Current Shunt control output) port is N-channel open drain output to control the external high power shunt transistor for synthesizing AC and DC impedance.
- DC conditions : normal operating mode is from 15mA to 100mA. An operating mode with reduced performance is from 5mA to 15mA. In the line hold range from 0mA to 5mA the device is in a power down mode and the voltage at U201 pin 37 LI (Line Input) port is reduced to a maximum of 3.5V. The DC characteristic is determined by the voltage at U201 pin 37 LI port and a R215 resistor between U201 pin 37 LI and pin 39 LS port. It can be calculated by the following equation : $V_{LS} = V_{LI} + I_{LINE} \times R215$.

RING DETECT

- U201 pin 28(MO) is ring melody output port and this signal drive the Q207 which drive the FET201 which drive Photo coupler U204 for

artificial ring.

MF DIAL (Same as telephone section)

- U201 pin 2 DMS(Dial Mode Selection) port is set to VDD by R227 It is M/B ratio 33:66, and no power operation mode conducts only DP.
- MF signal appears (tone level of low group : typical -14dBm) at U201 pin 4 MFO(DTMF Generator Output). This signal is leveled by R226, R225 and C239, then to amplifier U201 pin 9 MFI(DTMF Amplifier Input).
- Line dial signals appear at U201 pin 39 LS(Line Current Sense Input).

DP DIAL (Same as Telephone section)

- U201 pin 2(DMS) is set to Vdd(33/67) or VSS(40/60) by R227 or R228 resistor.
- Dial pulses originate at U201 pin 27(DPn), which toggles Q205, which drives Q201. The resulting intermittent voltage interrupts the telephone line.
- Pulse M/B ratio is set by U201 pin 2 MDS port.
 $V_{dd} = 33/66$, and $V_{ss} = 40/60$.
- U201 pin 35 CS port : Modulation of line voltage and shorting the line during make period of pulse dialling.

LLC (Line Loss Compensation) / LOOP CURRENT DETECT

- When the LLC pin option. it is activated, the transmit and receive gains for both I/O are decreased 6dB at line currents above 20mA when the U201 pin 31 LLC is connected to AGND, and from 75mA when this pin is connected to VDD. The LLC is deactivated when LLC pin is connected to VSS.
- When CML201 or Hook Switch switches to telephone line, U201 on the LIU board and CPU (U1) on the Main board begin communication. U201 sends an <Ack> message containing the line current information to recognize a parallel phone.

Serial interface

- U201 pin 11 RXD: Schmitt trigger input (threshold = 2.5V) to serial interface.
- U201 pin 29 TXD: Open drain output from serial interface.
- The communication is standard UART :
 - Baud Rate 9600
 - Start Bit 1
 - Stop Bit 1
 - Data Bits 8
 - Parity Bit None
 - LSB is transferred prior to MSB.

Speech Circuit

- U201 (STI9510) and associated components.
- Handset transmitting circuit: Handset transmitter audio (Condensor MIC.) is filtered by R240, C232, C224, C225, C226, C227, C229 and C230, and then amplified by U201 pin 32 and 33 (M1, M2).
- Handset receiving circuit: Handset receiver (Dynamic unit) is filtered by R229, C241, C209, C203 and C231, and then applied to U201 pin 1 (ROH) and VSS.
- U201 pin 39 (LS) is audio output to telephone line.

5-6-2 Telephone Section

RINGER CIRCUIT

- When a ringing signal is applied to the line, Vdd of U201 (I-LIU) is charged via an external path. After Vdd has reached the operating voltage the oscillator starts and U201 detects the ring frequency.
After a valid ring frequency is applied to the U201 pin 25 RFD (Ring Frequency Discrimination) port, the ring melody generator of U201 sends out a 3-tone melody via U201 pin 28 MO (Ring Melody Output) port.
- U201: I-LIU and associated components.
- Ring frequency passes through DC blocking capacitor C206 (C205 for Switzerland or Austria) and Zener-diode ZD205 (ZD209 for Switzerland or Austria) to U201 pin 25 RFD port.
- Line ring voltage passes through DC blocking capacitor C201, current limit resistor R205, bridge diode BD201, CML relay, and Hook Switch to FET201 (BS170) pin 3, C214, ZD203 and R246.
- The ring frequency discriminator of U201 assures that only signals with a frequency between 13Hz and 70Hz are regarded as valid ring signals.
- When a valid ring signal is present for at least 73ms, the ring melody generator (pin 28, MO) is activated and remains active as long as a valid ring signal is present.
- U201 filters the ring signals and output is pin 28 (MO).
- The 3 basic melody frequencies are : F1 = 880 Hz, F2 = 1067 Hz, and F3 = 1333 Hz. The repetition rate is set to 4 which means that the sequence of F1, F2, F3, F1, F2, F3 is repeated 4 times within a second.

Sidetone Circuit

- Sidetone audio characteristics are controlled by R238, R235, R237, R239, and C202 connected to U201 pin 7 STB.

5-7 OPE PBA

OPE PBA serves as the Machine-User interface.

The OPE operates on a time-sharing basis. As shown below, OPE keys and LED control are divided into key scanning, LED displaytime and display time. On each 2ms interrupt rising edge, OPE line turns off after 125 μ sec initial delay, and after 1 CPUCLK cycle, LEDCTL-LOW makes LED turn off. During the next 128 CPUCLK cycles, OPE KEY STROBE is maintained and during the next 1 CPUCLK KEY, INPUT is scanned and stored in KEY buffer.

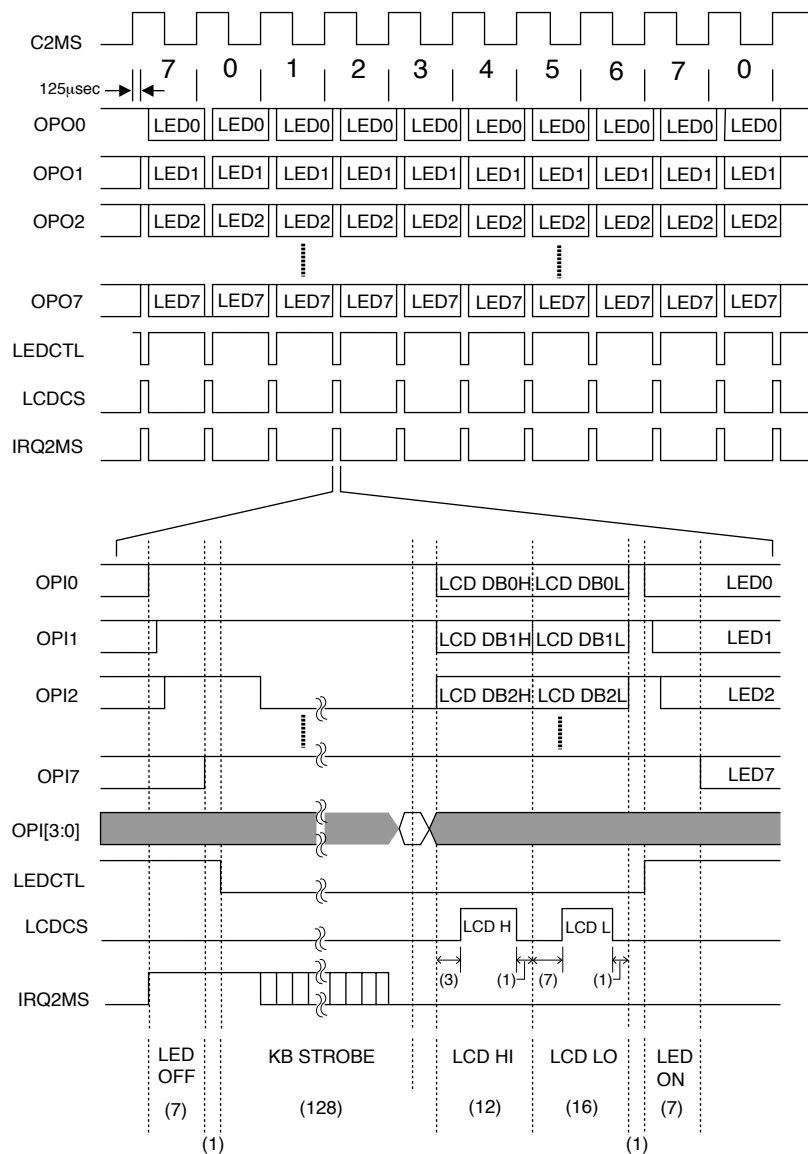
After key scanning, through the OPO0-3 port the upper and lower nibble data are transferred to the LCD module as LCDCTL goes high.

After key displaying DATA on LCD, LED lamps turn on with LEDCTL-ON.

OPO0-4 : Used as key board strobe or LCD, LED driver

OPO5-7 : Used as key board strobe.

OPI0-3 : Key scanning ports from key matrix.



[X] = Time Interval of TSTCLK's

4. Disassembly and Reassembly

Note: Make sure power is OFF by removing the power cord from the wall outlet.

4-1 Tx Guide

- Open the operating panel assembly.
- Carefully lift the TX guide, as shown in the figure.

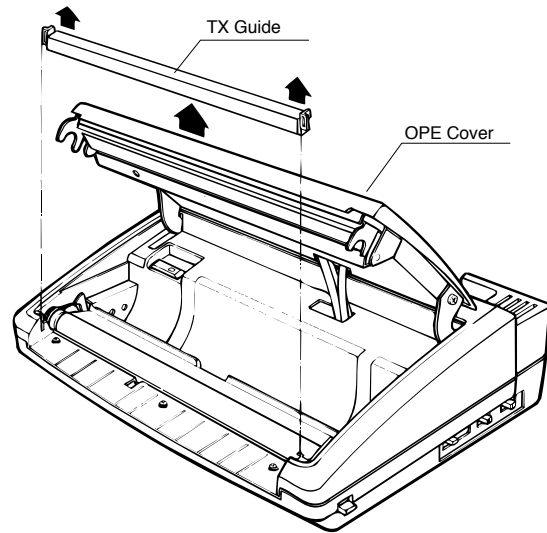


Figure 4-1

4-2 Top Cover

- Loosen the 5 screws fastening the top cover.
- Carefully lift the top cover.
- Remove the wire harness from the base, as shown in the figure.

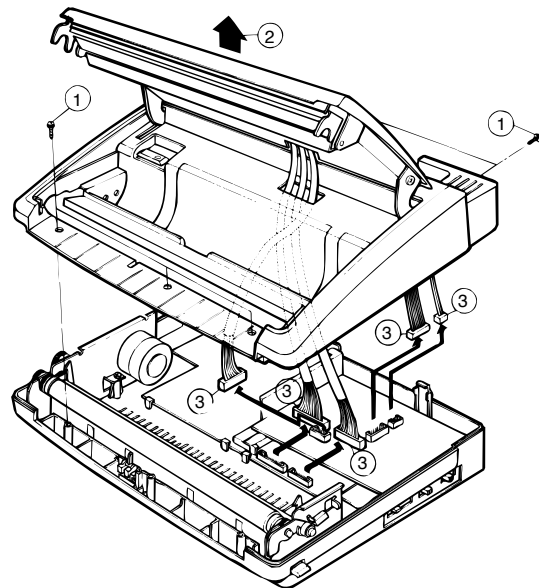


Figure 4-2

4-3. OPE Unit

- Loosen the 2 screws fastening the top cover.
- Carefully lift the OPE assembly, as shown by the arrow.

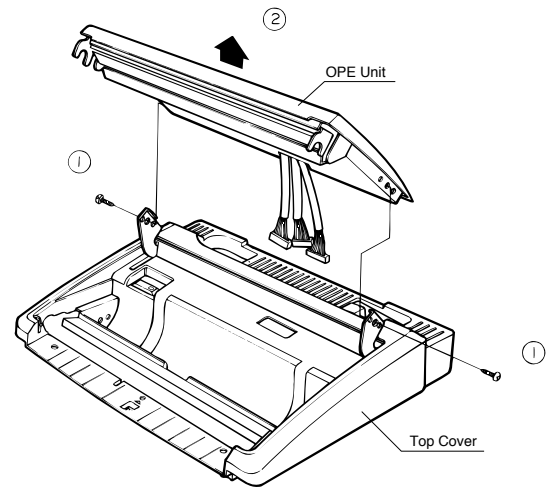


Figure 4-3

4-4. OPE Cover

- Loosen the 2 screws fastening the OPE chassis.
- Remove the Paper Empty sensor connector from the OPE board.
- Remove the OPE unit from the OPE chassis, as shown by the arrows.

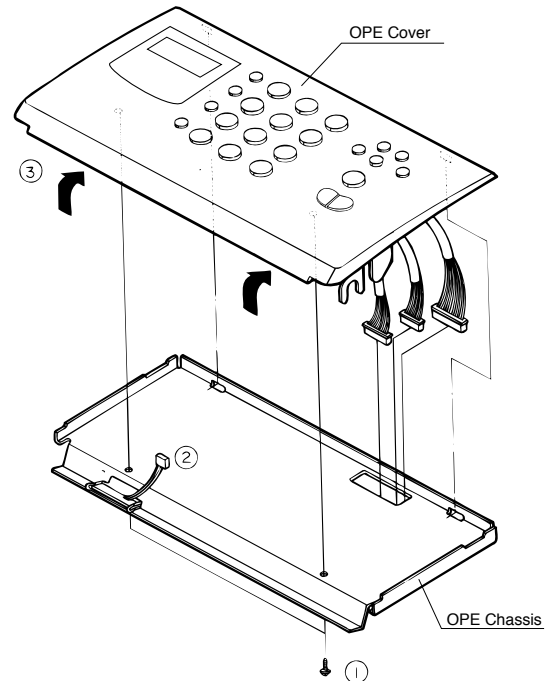


Figure 4-4

4-5. TPH

- Remove the TPH assembly from the OPE unit.
- Remove the TPH from the TPH assembly.
- Remove the TPH harness from the TPH connector.
- Remove the TPH guide from the TPH.

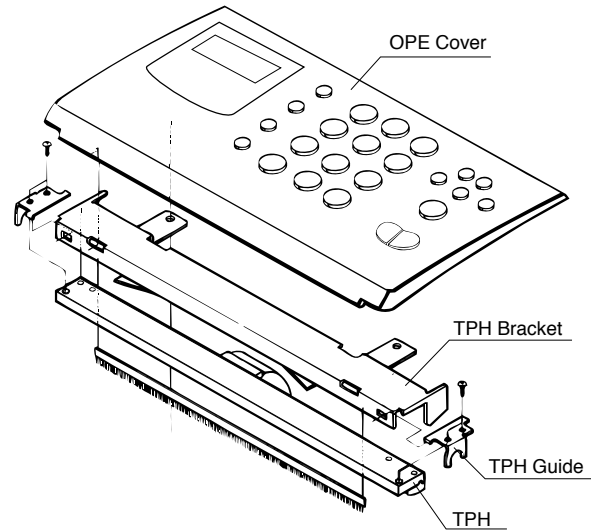


Figure 4-5

4-6. Main Frame

- Lift the white roller assembly.
- Loosen the 2 E-rings fastening the main chassis assembly.
- Remove the spring-lock.
- Loosen the 2 screws fastening the main chassis assembly.
- Lift the CIS assembly.
- Remove the document guide from the CIS assembly (2 screws).
- Remove the CIS guide from the CIS (2 screws).

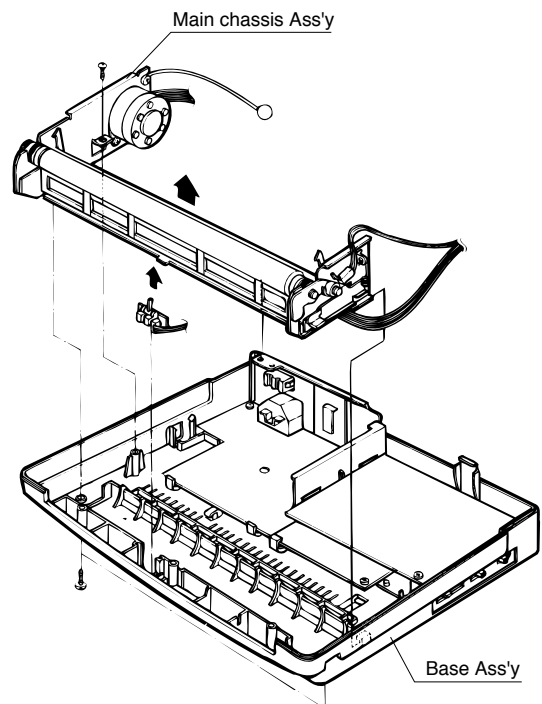


Figure 4-6

4-7. CIS

- Lift the white roller assembly.
- Loosen the 2 E-rings fastening the main chassis assembly.
- Remove the spring-lock.
- Loosen the 3 screws fastening the main chassis assembly.
- Lift the CIS assembly.
- Remove the document guide from the CIS assembly (2 screws).
- Remove the CIS guide from the CIS (2 screws).

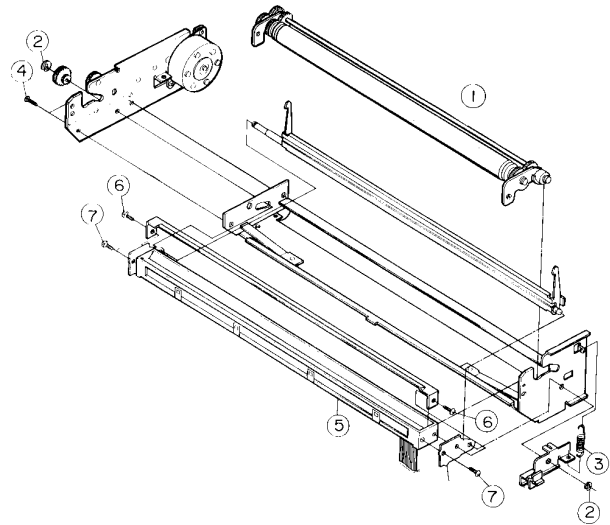


Figure 4-7

4-8. BOARDS & POWER SUPPLY

- Remove the handset modular harness from the LIU board.
- Loosen the screw fastening the LIU board and carefully lift the LIU board as shown by the arrow.
- Loosen the 3 screws connecting the main and daughter boards. Lift the rear bracket.
- Loosen the screw fastening the daughter board to the base. Lift the daughter board.
- Loosen the 2 screws fastening the power supply to the base. Lift the power supply and the main board to remove them.
- Lift the modular jack and the earth spring.

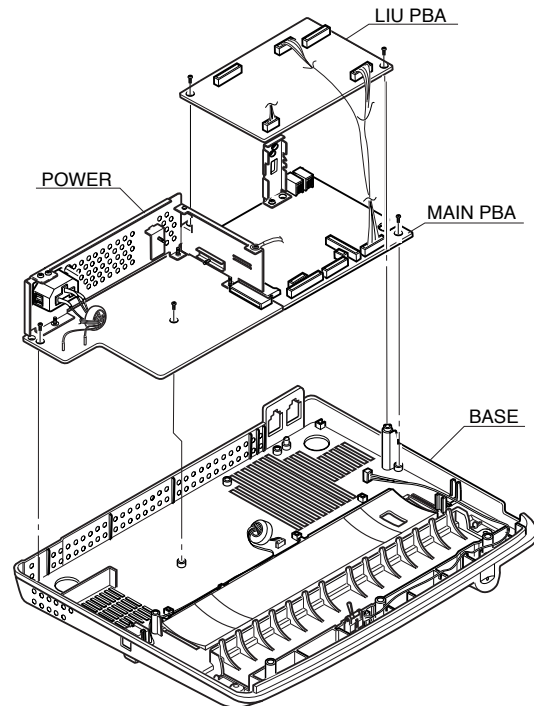


Figure 4-7

3. Operating Instructions

3-1 Service Mode

In Service Mode, the technician can check the machine and perform various tests to isolate a machine malfunction.

To enter Service Mode, press 'MENU, #, 1, 9, 3, 4' in sequence, and 'Ⓣ' will be displayed in the LCD to confirm that the machine has entered Service Mode. While in Service Mode, the machine still performs all normal operations. To return to normal User Mode, press 'MENU, #, 1, 9, 3, 4' in sequence again, or turn the power off, then on by unplugging and replugging the power cord.

3-2 Changing Options

3-2-1 Selectable Options

CONFIRMATION REPORT

Select whether a confirmation report prints each time a user sends a fax.

YES: The machine prints a report automatically after each fax sent.

ERROR : The machine prints a report only when there is an error.

NO: The machine does not print a report automatically. User can print the list on demand.

DIAL TYPE

Select the type of dial system to which the machine is connected.

Select MF if connected to a tone dial system.
Select DP if connected to a pulse dial system.
Use ^ or v buttons to select, then press Start.

RING COUNT

Select the number of rings the machine allows before it answers a call in automatic receiving mode.

CALLER ID

This is the number of the person faxing you.

Choose YES to turn on Caller ID display.
Choose NO to disable.

REMOTE RECEIVE CODE

This code can be used only with a phone extension connected to the FAX machine. The user can initiate FAX receive mode by entering a remote receiving code on the extension phone. The code is factory preset to * 9 *, and the middle character may be changed to any digit between 0 and 9.

AUTO PRINT

The machine prints a TX/RX journal automatically after every 20 fax sessions.

MODEM SPEED

Select baud rate of 9600, or 4800 bps. The lower the baud rate, the larger the acceptable error rate. T30 protocol has a fixed speed of 300 bps in the protocol mode. When the TX speed is set to 9600 bps, the RX speed will be V.29. When the TX speed is set to 4800 bps, the RX speed will be V.27 ter.

CALL TRANSFERRING

This feature allows the fax machine to transfer incoming caller's message to a specified remote location.

Choose YES to turn on this feature. The LCD display asks to enter the telephone number you want to be transferred.

Choose NO to turn off the feature.

CALL MONITORING

This feature enables you to hear callers leaving messages on the machine.

Choose YES to turn on this feature.

Choose NO to turn off this feature.

CHARGE SAVER

This feature lets the user dial into this machine from a remote phone and check whether anyone has left a message without being charged for a charge call. When toll saver is on and there are messages waiting to be heard, the machine answers on the number of rings you specify in the ring count option. If there are no messages, the machine answers on the second ring after the number specified. This gives the user time to hang up the phone before the machine answers - and saves the price of the call.

Choose YES to turn on charge saver.

Choose NO to turn off charge saver.

MESSAGE RECORDING TIME

You can select the maximum time allowed for caller messages and memos.

If you choose YES, the LCD display shows you the time limits available : 0 second, 30 seconds, 60 seconds or 90 seconds. Choose the proper time. If you choose 0, it allows callers to hear the greeting message but doesn't permit them to leave messages.

REMOTE PASSWORD

You can change the three-character password used to access your machine from a remote phone. The password is preset to "#139#" (pound one three nine pound) at the factory. The first and the last #'s are fixed, but you can change the middle numbers from 0 to 9.

Enter the characters you want to use, then press Start.

BATTERY ALARM

You can turn on the battery alarm feature. With this feature on, the machine displays the low battery message in the LCD and sounds beeps to alert you low battery condition.

Choose YES to turn on the battery alarm feature.

Choose NO to turn off the battery alarm feature.

TAD SILENCE CHECK

In TAD mode, The machine decides the next action when detected a silence of 10 seconds.

The actions are:

RX : Switches to receive mode.

REC : Keeps the recording the silence.

CUT : Disconnect the line and returns to standby mode.

TX LEVEL

From -9 dBm to -15 dBm is acceptable. You can set the transmission level to between 0 and -15 dBm in 1dB steps using the control panel keypad.

Accuracy is + 0 / -3 dBm.

CABLE EQUALIZER

Copper telephone wire attenuates low frequencies less than high frequencies. The longer a cable is, the more pronounced the effect. To compensate for this attenuation you may need to set the machine to match the cable length currently used. Select short or long.

LINE MONITOR

Allows you to monitor line signals through the speaker.

RX LEVEL

Reception level may be too low due to cable losses. If set to - 43 dBm, reception sensitivity will be between 0 and - 43 dBm. If set to - 48 dBm, reception sensitivity will be between -5 and -48 dBm.

BUSY TONE DETECTION LEVEL

While checking tone in ANS/FAX mode, If any signal which is great than set level is detected for a few seconds the machine will disconnect the line.

BUSY ON DROP OUT TIME

While checking busy on time, if any signal noise is detected, the machine will ignore the signal noise unless it is greater than a specified time.

BUSY OFF DROP OUT TIME

While checking busy off time, if any signal noise is detected, the machine will ignore the signal noise unless it is greater than a specified time.

PAUSE TIME

Adjust the period of pause time to wait for a second dial tone in a PABX or mobile paging system. You can adjust the time from 0 sec to 9 sec (0 to 9).

RECALL TIME

When a call comes in and you want to connect it to another party, you can transfer the call by using a timed-break recall funtion.

This funtion must make a properly timed break authorized by the country. The machine can select times of 100, 280, or 600 msat an accuracy of ± 10 ms of the setting.

MH/MR CODING

Selection the coding method used for picture detail

MR = Use MR and MH coding.

MH = Use only MH coding.

RING ON CHECK TIME

The machine must receive a ring signal with a specified active time from a telephone exchange in automatic reception mode. The detection time that the machine considers valid is adjustable via this option. If the active time of the ring signal is less than the set value of the Ring On Check Time, the machine will not consider it a ring signal.

RING OFF CHECK TIME

The machine must receive a ring signal with a specified inactive time, as well as an active time. If the inactive time of the ring signal is longer than the value of the Ring Off Check Time, the machine will not consider it a valid ring signal.

3-2-2 Changing Options

Press '**MENU**, 3, **Start**/COPY' in sequence. Press ^ or v to select the desired option item.

When the desired item appears, press **Start** and use ^ or v to change the status of the selected option.

3-3 Test Mode

Test Mode is used to test machine functions. To enter Test Mode, press '**MENU**, 0, **START/COPY**' in sequence.

TPH TEST

The TPH test pattern checks the heating element of the TPH. Figure 3-1 is a sample test pattern.

Figure 3-1: TPH Test Pattern

MODEM TEST

The modem will transmit send various signals on the telephone line to check the following:

- FSK Test
- Tone Test: 1100 Hz, 1650 Hz, 1850 Hz, 2100 Hz
- G3 training: 9600, 4800 bps
- RX Loop Test
- DTMF Test

ROM TEST

Tests machine ROM (Read Only Memory). The result and the software version appear in the LCD in the following format:

CHKSUM= VXX/XX, OK

ALL MEMORY CLEAR

Erases contents of RAM. When memory is cleared, the machine returns to default settings.

3-4 Report Printout

A number of useful reports can be printed in Service Mode. One of these lists is the protocol list, which contains detailed information which may be required when contacting technical support. To print this list, press **MENU**, 4, **START/COPY** in sequence.

When a report name appears in the display, scroll through the list of reports by pressing ^ or v. When a desired report is selected, press **START/COPY**.

CONFIRMATION REPORT

Shows the last transmission result.

TX/RX JOURNAL

Shows information about faxes sent and received.

SYSTEM DATA LIST

Shows all option settings.

TEL. NUMBER LIST

Lists all numbers stored in the machine's One-Touch and Speed-Dialling memory.

PROTOCOL LIST

This list is available in Service Mode only, and shows the sequence of the CCITT group 3 T.30 protocol during the most recent TX or RX operation. You can check for send and receive errors with this list.

If a communication error occurs while the machine is in Service Mode, the protocol list will print automatically.

HELP LIST

This report illustrates the machine's basic functions and commands. Use as a quick reference guide.

To print this list, press **HELP** (#).

3-5 LCD Display

3-5-1 During communication

In User Mode, the LCD shows the remote machine's TTI number, communication type, (send or receive), and page number.

In Service Mode, the display shows the communication type, abbreviations for the CCITT Group 3 T.30 protocol as they occur, the protocol type (G3), coding type (MH), baud rate in kbps, and line time.

3-5-2 If a communication problem occurs:

In User Mode, the display shows one of the following reasons: CAM JAM, COMM. ERROR, CHECK DOCUMENT.

In Service Mode, the display shows all error messages available in User Mode, as well as additional error messages not available in User Mode.

Error messages shown only in Service Mode are:

PRE-MESSAGE ERROR:
problem occurred during phase B of session

MESSAGE ERROR:
problem occurred during phase C of session

POST-MESSAGE ERROR:
problem occurred during phase D of session

LINE ERROR:
machine cannot connect or has lost connection with the remote machine

Additional messages, not shown above, will appear in the TX/RX journals printed in Service Mode.

2 Specification

2-1 Transmitter

Parameter		Specification
Document Size	Normal	210 x 297 mm
	Max.	216 x 1500 mm
	Min.	152 x 76 mm
Document Thickness		0.085 x 0.115 mm
Scan Line Length	Horizontal	A4 paper, 1728 scan elements along 216 line length
Effective Scanning Width	Vertical	216 mm
Scanning Method	Horizontal	Flat-bed scanning using CIS
	Vertical	Stepping motor
Resolution	Horizontal	8 dots/mm
	Vertical	Standard: 3.85 lines/mm
		Fine: 7.7 lines/mm
		Super Fine: 15.4 lines/mm

2-2 Receiver

Parameter		Specification
Coding Scheme		MH (Modified Huffman)/MR (Modified READ)
Recording Paper Size		216 mm x 30 m; core diameter: 12.7 mm
Effective Recording Width		210 mm
Recording Method		Solid state Thermal Printing Head
Resolution	Horizontal	8 dots/mm
	Vertical	Standard: 3.85 lines/mm
		Fine: 7.7 lines/mm
		Super Fine: 15.4 lines/mm

2-3 Line Control Blockk

Parameter	Specification
Communication Facility	Public Switched Telephone Network (PSTN)
Line Coupling	Direct
Transmission Speed	9600, 7200, 4800, 2400 bps
Modem	QAM, DPSK and FSK (V.29, V.27ter with fall back function and V.21)
Carrier Frequency	1700 Hz (9600/7200 bps)
	1800 Hz (4800/2400 bps)
Control Signal	1100 Hz (CNG)
	2100 Hz (CED)
	300 bps (FSK)
Output Level	0 dBm to - 15 dBm +0.0 / -3 dBm, adjustable in 1 dB steps
Input Sensitivity	0 dBm to - 48 dBm in two ranges
Input & Output Impedance	600 ohm

2-4 Others

Parameter		Specification
Dialling Signal		DP/DTMF
Dialling Method		Manual; Memory dialling; Last Number Redialling
Memory Capacity		34 memory dial (power on)
Power Requirement		Check power label attached near the power cord connection.
Power Consumption	Stand-by	7 Watt
	In use	Max. 115 Watt
Temperature		5 °C to 45 °C
Relative Humidity		20 to 80 % RH (Non-Condensing)
Dimension	Width	278 mm
	Depth	211 mm
	Height	107 mm
	Weight	2.5 kg

7 Electrical Parts List

7-1 MAIN PBA

Capacitor / Resistor tolerance:

D: 0.5 %, F: 1 %, G: 2 %, J: 5 %, K: 10 %, M: 20 %, Z: +80 %, -20 %

Ref. No.	Description	SEC Code	Remark
	PBA, PCB Assembly, MAIN	JF92-00842E	
	- Capacitors -		
C1	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
C2	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C3	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
C4	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
C5	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C7	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C8	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C9	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C10	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C11	Ceramic, Chip, 33 nF, K, 50 V, 2012	2203-000802	
C12	Ceramic, Chip, 33 nF, K, 50 V, 2012	2203-000802	
C13	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C14	TA, Chip, 1 μ F, M, 10 V, 3216	2404-000291	
C15	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C16	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C17	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C18	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C19	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C20	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C21	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C22	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
C23	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C24	Ceramic, Chip, 10 pF, 0.05 pF, 50 V	2203-000281	
C25	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C26	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C27	Ceramic, Chip, 18 pF, J, 50 V, 2012	2203-000429	
C28	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
C29	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
C30	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C31	Ceramic, Chip, 39 pF, J, 50 V, 2012	2203-000858	
C32	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C33	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
C34	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	

	Ref. No.	Description	SEC Code	Remark
	C35	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C36	Ceramic, Chip, 18 pF, J, 50 V, 2012	2203-000429	
	C37	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C38	TA, Chip, 1 μ F, M, 10 V, 3216	2404-000291	
	C39	TA, Chip, 1 μ F, M, 10 V, 3216	2404-000291	
	C40	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C43	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C44	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C45	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C46	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C47	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C48	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C49	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C50	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C51	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C52	Ceramic, Chip, 10 pF, 0.5 pF, 50 V, 2012	2203-000281	
	C53	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C54	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C55	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C56	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C57	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C58	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C59	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C60	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C62	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C63	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C64	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C65	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C66	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C67	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C68	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C69	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C70	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C71	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C72	Ceramic, Chip, 1 nF, K, 50 V, 2012	2203-000444	
	C73	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C74	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C75	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C76	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C77	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C78	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C79	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	

	Ref. No.	Description	SEC Code	Remark
	C80	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C81	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C82	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C83	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C84	Ceramic, Chip, 100 pF, J, 50 V, 2012	2203-000239	
	C85	Ceramic, Chip, 100 nF, Z, 50 V, 2012	2203-000192	
	C87	Electrolytic, 10 μ F, M, 25 V	2401-000448	
	C88	Electrolytic, 10 μ F, M, 25 V	2401-000448	
	C89	Electrolytic, 22 μ F, M, 25 V	2401-000943	
	C90	Electrolytic, 10 μ F, M, 25 V	2401-000448	
	C91	Electrolytic, 10 μ F, M, 25 V	2401-000448	
	C93	Electrolytic, 3.3 μ F, M, 50 V, BP	2401-001014	
	C94	Electrolytic, 10 μ F, M, 25 V	2401-000448	
	C95	Electrolytic, 10 μ F, M, 25 V	2401-000448	
	C97	Ceramic, Chip, 220 nF, K, 50 V, 2012	2203-000609	
	- Connectors -			
	P1	Header, 1 Wall, 10 P, 1R, 2.5 mm, STR	3711-002034	
	P2	Header, Box, 14 P, 1R, 2 mm, STR	3711-002815	
	P3	Header, Box, 12 P, 1R, 2 mm, STR	3711-002813	
	P4	Header, 22 P, 2R, 2 mm, STR	3711-002002	
	P5	Header, 18 P, 2R, 2 mm, STR	3711-002000	
	P6	Header, 3 Wall, 6 P, 1R, 2 mm, STR	3711-000496	
	P7	Header, 3 Wall, 5 P, 1R, 2 mm, STR	3711-000484	
	P8	Header, 3 Wall, 2 P, 1R, 2 mm, STR	3711-000444	
	P9	Header, 3 Wall, 2 P, 1R, 2 mm, STR	3711-000443	
	SOK1	Socket-IC, 32 P, DIP, 2.54 mm	3704-000255	
	- Diodes -			
	D3	Switching, 100 V, 200 mA, 225 mW, 4 ns	0401-000116	
	D4	Switching, 100 V, 200 mA, 225 mW, 4 ns	0401-000116	
	D5	Switching, 100 V, 200 mA, 225 mW, 4 ns	0401-000116	
	D6	Switching, 100 V, 200 mA, 225 mW, 4 ns	0401-000116	
	D7	Switching, 100 V, 200 mA, 225 mW, 4 ns	0401-000116	
	D8	Switching, 100 V, 200 mA, 225 mW, 4 ns	0401-000116	
	ZD1	Zener, PTZ5.1B, 5.1V-5.7V, 1W	0403-000464	
	ZD2	Zener, PTZ12B, 5.1 V, 12.0V-13.5V, 1W	0403-001142	
	ZD3	Zener, 3.9 V, 5 %, 1 W, 1N4730	0403-000521	
	ZD4	Zener, 3.9 V, 5 %, 1 W, 1N4730	0403-000521	
	- ICs -			
	U1	4558, SOP, 8P	1201-000189	
	U2	74HC32, OR Gate, SOP, 14 P	0801-000410	
	U3	MX93000A, QFP, 44 P	1205-001333	
	U4	SRAM, 62256, 32k x 8 bit, DIP, 28 P	1106-001037	

	Ref. No.	Description	SEC Code	Remark
	U5	EPROM, 27010, 128k x 8 bit, DIP, 32 P	1102-000191	
	U6	44C1000, 1M x 4 bit, SOJ, 20 P	1105-000133	
	U7	Micro Computer	JF09-10053A	
	U8	6305, 16 bit, QFP, 80 P	0904-001068	
	U9	Reset, 78L05, SOT-89, 3 P	1203-001037	
	U10	74HC245, Transceiver, SOP, 20 P	0801-000696	
	U11	Photo-Coupler, PC817, 200 mW, DIP-4	0604-000119	
	U12	Photo-Coupler, PC817, 200 mW, DIP-4	0604-000119	
	U14	TR-Array, UL2003L, NPN, SOP-16, ST	0506-000182	
	- Resistors -			
	R1	Chip, 20 kohm, J, 1/10 W, 2012	2007-000546	
	R2	Chip, 205 kohm, F, 1/10 W, 2012	2007-007434	
	R3	Chip, 15 kohm, J, 1/10 W, 2012	2007-000409	
	R4	Chip, 75 kohm, J, 1/10 W, 2012	2007-000002	
	R5	Chip, 46.4 kohm, F, 1/10 W, 2012	2007-000917	
	R6	Chip, 18 kohm, J, 1/10 W, 2012	2007-000457	
	R8	Chip, 390 kohm, F, 1/10 W, 2012	2007-001663	
	R9	Chip, 150 kohm, F, 1/10 W, 2012	2007-000392	
	R10	Chip, 2.2 kohm, J, 1/10 W, 2012	2007-000493	
	R11	Chip, 330 kohm, J, 1/10 W, 2012	2007-000757	
	R12	Chip, 4.7 kohm, J, 1/10 W, 2012	2007-000872	
	R13	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R14	Chip, 330 kohm, J, 1/10 W, 2012	2007-000757	
	R15	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R16	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R17	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R18	Chip, 100 ohm, J, 1/10 W, 2012	2007-000290	
	R19	Chip, 100 ohm, J, 1/10 W, 2012	2007-000290	
	R20	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R21	Chip, 100 ohm, J, 1/10 W, 2012	2007-000290	
	R22	Chip, 51 ohm, J, 1/10 W, 2012	2007-007162	
	R23	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R24	Chip, 1 kohm, J, 1/10 W, 2012	2007-000468	
	R25	Chip, 118 kohm, F, 1/10 W, 2012	2007-000325	
	R26	Chip, 86.6 kohm, F, 1/10 W, 2012	2007-001220	
	R27	Chip, 86.6 kohm, F, 1/10 W, 2012	2007-001220	
	R28	Chip, 34.8 kohm, G, 1/10 W, 2012	2007-000784	
	R29	Chip, 34.8 kohm, G, 1/10 W, 2012	2007-000784	
	R30	Chip, 86.6 kohm, F, 1/10 W, 2012	2007-001220	
	R31	Chip, 300 ohm, J, 1/10 W, 2012	2007-000728	
	R32	Chip, 787 kohm, F, 1/10 W, 2012	2007-002888	
	R33	Chip, 300 ohm, J, 1/10 W, 2012	2007-000728	

	Ref. No.	Description	SEC Code	Remark
	R34	Chip, 46.4 kohm, F, 1/10 W, 2012	2007-000917	
	R35	Chip, 1 kohm, J, 1/10 W, 2012	2007-000468	
	R36	Chip, 150 ohm, J, 1/10 W, 2012	2007-000401	
	R38	Chip, 1 Mohm, J, 1/10 W, 2012	2007-000477	
	R39	Chip, 3 kohm, J, 1/10 W, 2012	2007-000844	
	R40	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R41	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R42	Chip, 100 kohm, J, 1/10 W, 2012	2007-000282	
	R43	Chip, 20 ohm, J, 1/10 W, 2012	2007-001289	
	R44	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R45	Chip, 4.7 kohm, J, 1/10 W, 2012	2007-000872	
	R46	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R47	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R48	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R49	Chip, 4.7 kohm, J, 1/10 W, 2012	2007-000872	
	R50	Chip, 34.8 kohm, G, 1/10 W, 2012	2007-000784	
	R51	Chip, 0 ohm, J, 1/10 W, 2012	2007-000029	
	R52	Chip, 34.8 kohm, G, 1/10 W, 2012	2007-000784	
	R53	Chip, 0 ohm, J, 1/10 W, 2012	2007-000029	
	R54	Chip, 10 kohm, J, 1/10 W, 2012	2007-000300	
	R55	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R56	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R57	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R58	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R59	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R60	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R61	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R62	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R63	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R64	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R65	Chip, 470 ohm, J, 1/10 W, 2012	2007-000931	
	R68	220 ohm, J, 1/4 W	2001-000034	
	R69	Chip, 15 kohm, J, 1/10 W, 2012	2007-000409	
	- Miscellaneous -			
	Q1	Small Signal, KSA1182, PNP, 150mW	0501-000279	
	Q2	Small Signal, KSC5019, NPN, 750mW	0501-000385	
	Q3	Small Signal, KSC1623, NPN, 200mW	0501-000342	
	ARR2	Varistor, 600 V, 500 A, 7.0 x 3.3 mm, TP	1405-001009	
	ARR3	Varistor, 600 V, 500 A, 7.0 x 3.3 mm, TP	1405-001009	
	L1	Inductor, Chip, 3.3 μ H, 5 %	2703-000185	
	L2	Inductor, Chip, 3.3 μ H, 5 %	2703-000185	
	L3	Coil-Filter, 60 μ H, 50 Mohm, 18 T	JF27-60051A	

Electrical Parts List

	Ref. No.	Description	SEC Code	Remark
	L4	Coil-Filter, 60 μ H, 50 Mohm, 18 T	JF27-60051A	
	L7	Coil-Filter, 60 μ H, 50 mohm, 18 T	JF27-60051A	
	L8	Coil-Filter, 60 μ H, 50 mohm, 18 T	JF27-60051A	
	L9	Coil-Filter, 60 μ H, 50 mohm, 18 T	JF27-60051A	
	MJ1	Modular-Jack, 6P/6C, Ivory	3722-000255	
	X1	Crystal, 32.768 kHz, 5 ppm	2801-001498	
	X2	Crystal, 24.00014 MHz, 50 ppm	2801-001528	
	X3	Crystal, 29.4912 MHz, 50 ppm	2801-001530	
	BAT	Battery-LI, 3V, 210mAH, Button	4301-000108	
	BUZ1	Buzzer, 81 dB, 1.5 V, 70 mA, 2.731kHz	3002-000126	
	JP1	Wire, Jumper, 52 mm, AWG22		
	JP6	Wire, Jumper, 52 mm, AWG22		
	PCB	PCB, MAIN, Blank		

7-2. LIU PBA

Ref. No.	Description	SEC Code	Remark
	PBA, PCB Assembly, LIU	JF92-00843A	
	- Capacitors -		
C201	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
C202	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
C203	Electrolytic, 330 nF, M, 50 V, GP	2401-001087	
C206	Film, MPEF, 1 μ F, K, 250 V	2305-000505	
C207	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
C208	Electrolytic, 470 μ F, M, 16 V, GP	2401-001368	
C209	Electrolytic, 22 μ F, M, 50 V, GP	2401-000966	
C210	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
C212	Film, MPEF, 15 nF, M, 630 V	2305-000199	
C214	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
C216	Film, PEF, 47 nF, K, 50 V	2301-000278	
C217	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
C218	Electrolytic, 100 nF, M, 50 V, GP	2401-000217	
C220	Ceramic, Chip, 2.2 nF, K, 50 V	2203-000499	
C221	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
C222	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
C223	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
C225	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
C226	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
C227	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
C228	Ceramic, Chip, 15 nF, K, 50 V	2203-000376	
C229	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
C230	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
C231	Ceramic, Chip, 100 nF, K, 50 V	2203-001450	
C232	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
C233	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
C234	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
C235	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
C236	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
C239	Ceramic, Chip, 3.3 nF, K, 50 V	2203-000717	
C240	TA, Chip, 1 μ F, M, 10 V	2404-000291	
C241	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
C242	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
C243	Ceramic, Chip, 15 nF, K, 50 V	2203-000376	
C244	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
C247	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
C248	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
C249	Ceramic, Chip, 68 nF, K, 50 V	2203-001145	

	Ref. No.	Description	SEC Code	Remark
		PBA, PCB Assembly, LIU	JF92-00843A	
		- Capacitors -		
	C201	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
	C202	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
	C203	Electrolytic, 330 nF, M, 50 V, GP	2401-001087	
	C206	Film, MPEF, 1 μ F, K, 250 V	2305-000505	
	C207	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
	C208	Electrolytic, 470 μ F, M, 16 V, GP	2401-001368	
	C209	Electrolytic, 22 μ F, M, 50 V, GP	2401-000966	
	C210	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
	C212	Film, MPEF, 15 nF, M, 630 V	2305-000199	
	C214	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
	C216	Film, PEF, 47 nF, K, 50 V	2301-000278	
	C217	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
	C218	Electrolytic, 100 nF, M, 50 V, GP	2401-000217	
	C220	Ceramic, Chip, 2.2 nF, K, 50 V	2203-000499	
	C221	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C222	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C223	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C225	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
	C226	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C227	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C228	Ceramic, Chip, 15 nF, K, 50 V	2203-000376	
	C229	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
	C230	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C231	Ceramic, Chip, 100 nF, K, 50 V	2203-001450	
	C232	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C233	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C234	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C235	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C236	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C239	Ceramic, Chip, 3.3 nF, K, 50 V	2203-000717	
	C240	TA, Chip, 1 μ F, M, 10 V	2404-000291	
	C241	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C242	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C243	Ceramic, Chip, 15 nF, K, 50 V	2203-000376	
	C244	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
	C247	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
	C248	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
	C249	Ceramic, Chip, 68 nF, K, 50 V	2203-001145	
	Ref. No.	Description	SEC Code	Remark
	C250	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	

	Ref. No.	Description	SEC Code	Remark
		PBA, PCB Assembly, LIU	JF92-00843A	
		- Capacitors -		
	C201	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
	C202	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
	C203	Electrolytic, 330 nF, M, 50 V, GP	2401-001087	
	C206	Film, MPEF, 1 μ F, K, 250 V	2305-000505	
	C207	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
	C208	Electrolytic, 470 μ F, M, 16 V, GP	2401-001368	
	C209	Electrolytic, 22 μ F, M, 50 V, GP	2401-000966	
	C210	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
	C212	Film, MPEF, 15 nF, M, 630 V	2305-000199	
	C214	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
	C216	Film, PEF, 47 nF, K, 50 V	2301-000278	
	C217	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
	C218	Electrolytic, 100 nF, M, 50 V, GP	2401-000217	
	C220	Ceramic, Chip, 2.2 nF, K, 50 V	2203-000499	
	C221	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C222	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C223	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C225	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
	C226	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C227	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C228	Ceramic, Chip, 15 nF, K, 50 V	2203-000376	
	C229	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
	C230	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C231	Ceramic, Chip, 100 nF, K, 50 V	2203-001450	
	C232	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C233	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C234	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C235	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C236	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C239	Ceramic, Chip, 3.3 nF, K, 50 V	2203-000717	
	C240	TA, Chip, 1 μ F, M, 10 V	2404-000291	
	C241	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C242	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	
	C243	Ceramic, Chip, 15 nF, K, 50 V	2203-000376	
	C244	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
	C247	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
	C248	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	
	C249	Ceramic, Chip, 68 nF, K, 50 V	2203-001145	
	Ref. No.	Description	SEC Code	Remark
	C250	Ceramic, Chip, 100 pF, K, 50 V	2203-000242	

	Ref. No.	Description	SEC Code	Remark
		PBA, PCB Assembly, LIU	JF92-00843A	
		- Capacitors -		
	C201	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
	C202	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
	C203	Electrolytic, 330 nF, M, 50 V, GP	2401-001087	
	C206	Film, MPEF, 1 μ F, K, 250 V	2305-000505	
	C207	Electrolytic, 100 μ F, M, 25 V, GP	2401-000310	
	C208	Electrolytic, 470 μ F, M, 16 V, GP	2401-001368	
	C209	Electrolytic, 22 μ F, M, 50 V, GP	2401-000966	
	C210	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
	C212	Film, MPEF, 15 nF, M, 630 V	2305-000199	
	C214	Electrolytic, 10 μ F, M, 50 V, GP	2401-000486	
	C216	Film, PEF, 47 nF, K, 50 V	2301-000278	
	C217	Electrolytic, 1 μ F, M, 50 V, GP	2401-000597	
	C218	Electrolytic, 100 nF, M, 50 V, GP	2401-000217	
	C220	Ceramic, Chip, 2.2 nF, K, 50 V	2203-000499	
	C221	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C222	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
	C223	Ceramic, Chip, 1 nF, J, 50 V	2203-000457	
	C225	Ceramic, Chip, 33 nF, K, 50 V	2203-000805	
	C226	Ceramic, Chip, 10 nF, K, 50 V	2203-000262	

7-3. OPE PBA

Ref. No.	Description	SEC Code	Remark
ASSEMBLY, OPE		JF92-00844A	
- Capacitors -			
C301	Ceramic, Chip, 100 pF, J, 50 V	2203-000242	
C302	Ceramic, Chip, 100 nF, K, 50 V	2203-000208	
- Diodes -			
D301	Switching, MMSD914T1	0401-000116	
D302	Switching, MMSD914T1	0401-000116	
D303	Switching, MMSD914T1	0401-000116	
D304	Switching, MMSD914T1	0401-000116	
D305	Switching, MMSD914T1	0401-000116	
D306	Switching, MMSD914T1	0401-000116	
LED301	LED, Chip, Red, 60 mW, 2 V	0601-000208	
LED302	LED, Chip, Red, 60 mW, 2 V	0601-000208	
LED303	LED, Chip, Red, 60 mW, 2 V	0601-000208	
- Resistors -			
R301	Chip, 300 ohm, J, 1/8 W	2007-000730	
R302	Chip, 10 kohm, J, 1/8 W	2007-000303	
R303	Chip, 300 ohm, J, 1/8 W	2007-000730	
R306	Chip, 10 kohm, J, 1/8 W	2007-000303	
R307	Chip, 10 kohm, J, 1/8 W	2007-000303	
R308	Chip, 10 kohm, J, 1/8 W	2007-000303	
R309	Chip, 10 kohm, J, 1/8 W	2007-000303	
R310	Chip, 200 ohm, J, 1/8 W	2007-000542	
R311	Chip, 300 ohm, J, 1/8 W	2007-000730	
R312	Chip, 10 kohm, J, 1/8 W	2007-000303	
- Miscellaneous -			
J301	Resister, Chip, 0 ohm, J, 1/8 W	2007-000033	
J302	Resister, Chip, 0 ohm, J, 1/8 W	2007-000033	
J303	Resister, Chip, 0 ohm, J, 1/8 W	2007-000033	
J304	Resister, Chip, 0 ohm, J, 1/8 W	2007-000033	
P301	CBF, LIU-OPE Harness	JF39-40957A	
P302	CBF, MAIN-OPE Harness	JF39-41081A	
P303	CBF, MAIN-OPE Harness	JF39-41081A	
P304	Connector, Header, Box, 3 P	3711-000906	
P305	CBF, OPE-LCD Harness, FFC	JF39-41018A	
Q301	Small Signal, NPN, KSC1623-Y	0501-000342	
LCD	Display-LCD	JF07-20061A	

7-4. HOOK PBA

	Ref. No.	Description	SEC Code	Remark
		Assembly, HOOK	JF92-00845C	
	PCB	PCB, Blank, HOOK		
	SW1	Switch, Hook, SPPY43-B-S-01	3409-000117	
	P1	CBF, LIU-HOOK Harness	JF39-41080A	

7-5. D.DET PBA

	Ref. No.	Description	SEC Code	Remark
		Assembly, D.DET	JF39-40956A	
	PCB	PCB, Blank, D.DET		
	SEN1	Photo-Interrupter	0604-000230	
	P1	Harness, Main-D.DET	JF39-40956A	

7-6. P.EMPTY PBA

	Ref. No.	Description	SEC Code	Remark
		Assembly, P.EMPTY	JF92-00704B	
	PCB	PCB, Blank		
		Photo-Reflect Sensor, TLP908(LB)	0604-000246	
		Harness, P,EMPRY-Main	JF39-40960A	

7-7. HANDSET PBA

	Ref. No.	Description	SEC Code	Remark
		ASSEMBLY, HANDSET PCB	JF92-00625A	
	PCB	PCB, Blank, Handset		
	ZD1	Diode, Zener, 1N4736A	0403-000142	
	MIC	Mic, Condensor	3003-000103	

7-8. OTHERS

	Ref. No.	Description	SEC Code	Remark
		Display-LCD	JF07-20061A	
		LCD Harness	JF39-41018A	
		Harness, Main-OPE, RED	JF39-41064A	
		Harness, Main-OPE, BK / RD	JF39-40957A	
		Harness, Main-TPH	JF39-40955A	
		Thermal Print Head (TPH)	JF47-30069A	
		Earth Wire, Motor-Power, GRN	JF39-40963B	
		Harness, Main-CIS	JF39-4106A	
		Contact Image Sensor (CIS)	0609-001059	
		Motor-Step, 24V, 200 pps	3101-000143	
		Switch-Micro, 16V, 1A, SPST	3405-000166	
		Cord-Power	GA39-10100A	
		Cord-Curl	JF39-50054B	
		Cord-Tel Line	JF39-50079A	
		Power Supply, AC220 V	JF44-10059A	



Samsung Electronics Co.,Ltd. Mar. 1998.
Printed in Korea.
JF68-60936A